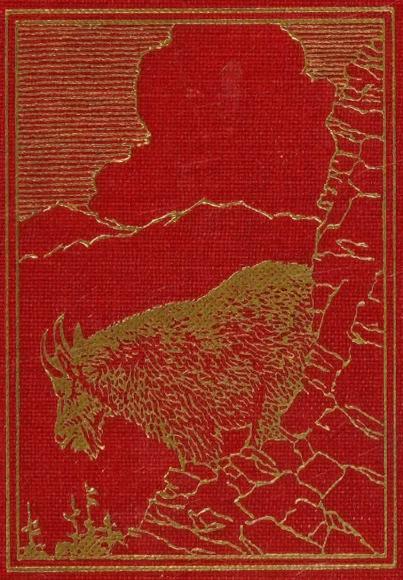
TALES FROM NATURE'S WONDERLANDS



W. T. HORNADAY

"A book prepared for young people, though the adult reader, unless he is well read in natural history, will find his view of the world enlarged by reading it. . . . Illustrated with excellent photographs and drawings of wild animal life."

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BY WILLIAM T. HORNADAY

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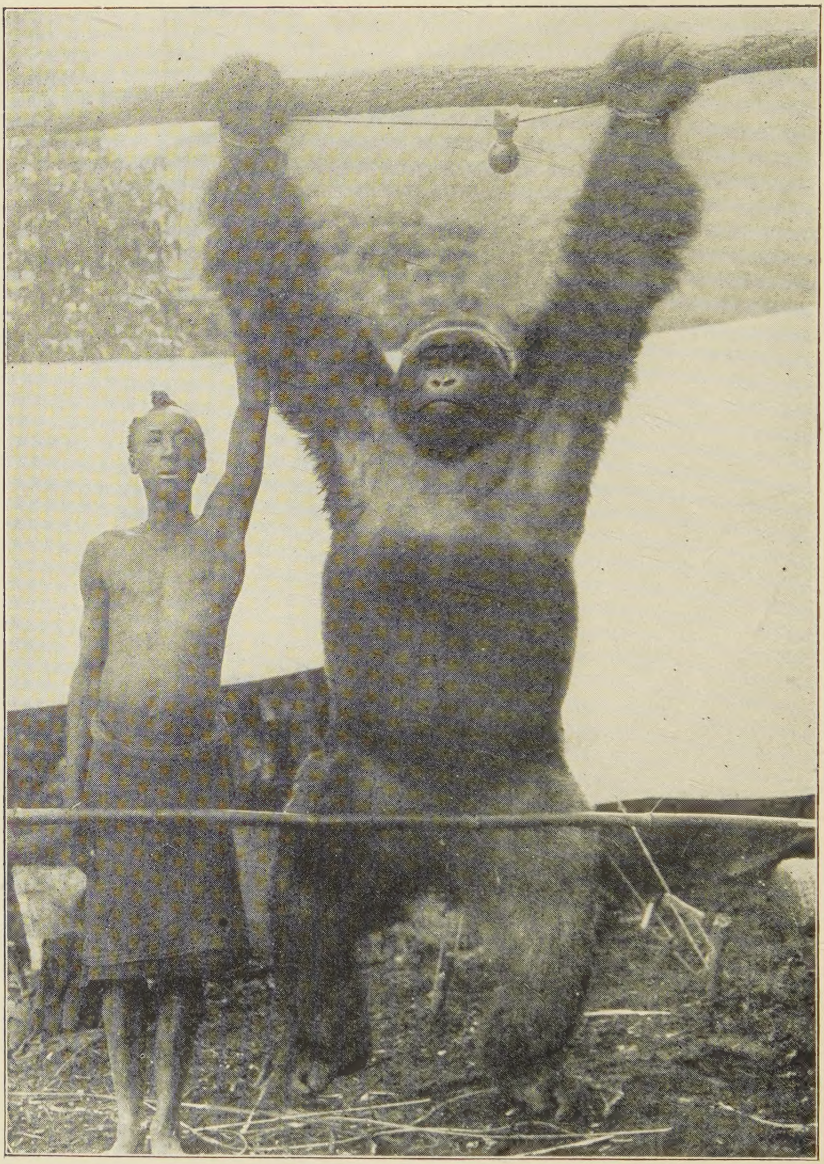

THE GIANT MOUNTAIN GORILLA OF EAST AFRICA.

Collected and photographed by T. Alexander Barns. The man is 5 feet 10 inches in height.

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TALES FROM NATURE'S WONDERLANDS

BY

WILLIAM T. HORNADAY, Sc.D., A.M.

AUTHOR OF "MINDS AND MANNERS OF WILD ANIMALS"
"CAMP-FIRES ON DESERT AND LAVA"
"CAMP-FIRES IN THE CANADIAN ROCKIES," ETC.

"And Nature, the old nurse, took
The child upon her knee,
And said, 'This is a story-book
Thy Father wrote for thee.'"

—LONGFELLOW

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BEFORE THE CURTAIN GOES UP

This world contains a great number of wonderful places; but alas! the millions can visit them only in imagination. In the past, long before history writing began, hosts of marvellous animals lived and died, and many wonderful things occurred. A few of the great and tragic events of the past we now know, from evidences so clear and so convincing that no reasonable person can dispute them. By piecing together broken bits of evidence, we can picture some of them with satisfactory accuracy. For example, the great Los Angeles wild-animal tragedy is just as well revealed by its records as are the main details of the Johnstown flood.

To the seeing eye and the thoughtful mind, truth is stranger than fiction. Really, I am astonished to find the extent to which in books for young people some of the greatest wonders of Nature have been overlooked, in behalf of animal-hero plots. Right gladly do we enter upon the diversion of placing some of the most wonderful things that we know before our boys and girls, and also older people who love the works of Nature. The desirability of this particular task was suggested to me by my efforts to relate to my three grandchildren, before our library fire, certain wonderful tales from the Book of Nature that I particularly wished they should not miss.

At the end of a day of toil, happy is he who can sit down by his good, cheerful light, and in sixty seconds be carried

on the wings of Thought to the hot-house jungles of Africa and its black gorillas; or to the Antarctic Continent with its giant penguins; or to the Siberian tundras and their frozen mammoths, or to the Pinacate wonderland of Sonora with its cacti, dwarf mountain sheep, lava-fields, and dead volcanoes.

One of the differences between an oyster and a boy is that an oyster has no imagination and every boy and girl has some. A keen and well-balanced imagination is a gift from the gods. A dull and colorless outlook is one of life's handicaps. Some say that too much imagination is worse than too little; but on that point I have my doubts.

Much may be done in cultivating a sound and healthy imagination, if the owner is caught when young. Every human being should learn to see things with what Hamlet shrewdly called the "mind's eye." To the youngster, and also to the oldster, who can take a well-made book of travel and adventure, and with it and his mind's eye see *the strange land, its wild men and its wild beasts, that bit of the world becomes his! Show me the normal American boy whom the pages of Defoe's immortal story cannot in five minutes transport to Crusoe's enchanted isle!*

To those who have some imagination, to those who can see with the mind's eye, I say, "Come on! Let us see what strange and interesting things we can find on our earth today, both of the present and the past."

W. T. H.

THE ANCHORAGE,
STAMFORD, CONN.,
Aug. 1, 1924.

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I

TALES FROM THE PAST

I

HOW SOME OF OUR BIG GAME CAME TO NORTH AMERICA

AH, yes! How *did* certain big wild animals get into our continent from Europe, Asia and Africa, where their great-grandparents were born?

It is a fearful distance back to the days of the three-toed horses, rhinoceroses, tapirs, camels and other beasts that North America gave to *southern Asia!* I do not propose to go back that far. It might make us think so long and so hard that it would hurt our heads.

This is really a very modern tale of certain wild animals that we can see, and know personally. Of the last happenings in animal travels to and from our home continent of North America, we may presume to judge something from living evidences. For the present, let the dead past bury its dead. We are interested in mountain sheep, reindeer, caribou, moose, the mastodon, the mammoth, the bison and a few other species with which we have at least a bowing acquaintance.

If I make a mistake about any of the elephant species, my critics will not fail to point it out; and then I will apologize. It seems to me, after due reflection, that the elephants must have "originated" in northern Africa;

but I do not insist upon it. I credit the first wapiti to Central Asia; but I do not feel like making even that a personal matter.

Neither do we invite the reader to go back millions of years, when there was only one great continent around the north pole, broken only by the North Atlantic Ocean. We must not be too extravagant in drawing checks on the Bank of Time.

This is a sketchy tale of a great bridge of land connecting the Old World with the New, that for ages was used by wonderful processions of wild animals. It was directly on the line of the Arctic Circle. On the strength of the living evidence furnished by our moose, sheep, caribou and other witnesses we believe that the whole of this story is presumably true.

This tale of a remarkable chain of events, and the stocking of North America with certain big game animals is due to the pioneering habits of free wild animals, and their man-like desire to know what lies "beyond the range." To them, always "the blue in the distance is beckoning on." Some people call this the migrating habit; but I call it genuine pioneering, of the same kind that explored and peopled the United States from Plymouth Rock to Tillamook.

Much farther back than any history goes, save that which is written in the eternal rocks, the prong-horned antelope and the Rocky Mountain goat lived in North America. So far as we can determine, those queer species were developed here; and because they have no near

relatives anywhere else we call them "unique"; which means standing quite alone.

The different ages of geologic time are measured by millions of years. In comparison with the "age of fishes," and the "age of reptiles," the lifetime of the land-animal species now inhabiting North America began so recently that we may almost speak of it as yesterday. At the same time the beginning of the story I shall now tell *may* date back fifty thousand years. Who can say?

The continents of the earth vary in age, just the same as nations and cities. Asia is the oldest, Europe and Africa come next, North America is middle-aged and South America is young. The oldest continents were the ones first supplied by Nature with mammals and birds. Some of the big wild animals of North America were immigrants from Asia. About all this there are thousands of details that we do not know, but some matters seem fairly well proved. For example:

When we find in North America a Rocky Mountain wapiti almost precisely like the wapiti of the older Altai Mountains of Central Asia, 8,000 miles away, we say: "Aha! This fellow's forefathers were born in Asia, and his great-grandfather came across to North America as an immigrant."

At that same time, however, we had a very good line of animals of our own. The giant bison of the past, with horns 7 feet wide, were huge beasts. The little three-toed horses date very far back; but the sabre-

toothed tigers, camels and giant ground sloths that left their skeletons for us safely preserved in the black asphalt beds of Los Angeles and elsewhere, lived in days so near that really they seem to have lived only yesterday.

I believe that the great-grandfathers of the American elk species were cradled in the Altai Mountains of Central Asia. There their descendants are found to-day, very closely resembling our Wyoming elk. From that region they ranged only a short way southward, and stopped in Tashkent. Heading northeastward, however, the Altai elk easily could have reached the Kamchatka Peninsula; and we can easily imagine that this thing happened:

At last, with abundant vigor and the urge of the pioneer spirit to see what was on the other side, the boldest of the explorers decided to venture farther northward along the coast; and finally they came to a point where a broad tongue of dry land thrust out eastward, dividing the sea. It was the Asia-America Bridge! Be it man or beast, it is the way of the pioneer to go on, and keep going, just so long as it is possible to find safe footing and food. Even to-day a modern mountain sheep or goat thinks nothing of crossing a thirty-mile desert or plain in order to find the answer to the eternal question: "What is on those mountains that is new to me, or good to eat?" The distance across Bering Strait from East Cape to Cape Prince of Wales is fifty-eight miles, and about midway there are two rock islets two miles apart,

with the America-Asia boundary passing between them. Ignalook is in America, Noornabook is in Asia.

Says Mr. Henry W. Elliott in *Our Arctic Province:*

"This gateway to the Arctic Ocean is closed by ice-floes usually by the middle or end of October every year, and opened again in the following season by May 25 or June 1, but the ice-fields do not allow much room for navigation north until the middle or end of June, and sometimes not until the end of June has been well passed."

On our Cape Prince of Wales there stands an Innuit village, which normally has a population of 400, "seamen in every sense,—hardy, reckless navigators who boldly launch themselves upon stormy waters and cross from land to land in tempests and fogs, depending solely upon the frail support of their walrus-skin baidars or oomiaks."

There is a small settlement of natives on the Asiatic side near East Cape, and it was only about ten years ago that Doctor Arthur W. Elting, E. Marshall Scull and Captain Kleinschmidt rescued them from a state of starvation by killing some walruses for them, and delivering the goods without extra charge.

Concerning the relations of the two continents, we have these facts to consider:

1. There is no evidence of a recent land connection between Europe and North America.

2. There are more than a score of wild-animal species now living in North America that are very closely related to existing species in Asia and Europe.

3. A former land bridge across Bering Strait, connecting Asia and North America, now is rather more than a supposition, but the annual ice bridge is to be set down as a fact.

4. Bering Strait is so shallow that but for the ice-floes a man-made bridge could be built across it. Its maximum depth at low water is *only one hundred and sixty-four feet*, and it has a hard, regular bottom of sand, gravel and silt. *Its depth of water is eight feet less than the height of Niagara Falls.*

Now, let us take a good look at a few of our largest North American animals, and see what we can learn from them. We will begin with our caribou species, because the evidence they offer is the most striking.

Europe and Asia have no caribou; but their reindeer are like twins with some of our barren-ground caribou. If you mix a herd of lusty domestic reindeer with a herd of Osborn caribou, you will have hard work to separate the species without mistakes.

In North America we have about nine species of caribou, and from the Alaskan side of Bering Strait they spread out like the ribs of a fan from the hand of its owner. They have been manufactured out of European-reindeer raw materials, by special food, climate and isolation.

Can you not, in your mind's eye, just *see* a herd of Old World reindeer landing on the Seward Peninsula, Alaska, from a journey over the great Bering Bridge, and fanning out east, southeast and south,—going on and on,

and settling in far remote regions, to found new species? Is not this evidence of species-making just as good proof as a wagon-track on a desert is proof of the passage of a wagon?

The descendants of those reindeer pioneers have changed to caribou, and sent their various species afield as far as Greenland, Labrador, Newfoundland, Maine, Quebec, Ontario, Idaho and British Columbia—a wonderful dispersal and a wonderful array of species. Their strange migratory habits are of great interest to the student of wild-animal life; but that is another story.

The story of the wild sheep of North America is so fascinating that we have devoted to it a chapter all its own.

The case of the gigantic moose, which in Europe is called the "elch," is a good parallel to that of the caribou, except that the moose had less wanderlust in their blood, and never scattered quite so widely. Nor did they develop in America more than two species. They did, however, wander far, and finally halt in Quebec, New Brunswick, Maine, Minnesota, Wyoming and British Columbia. The largest moose are in Alaska, the smallest in Wyoming, but all of them seem to be larger than the present moose of Europe and Asia.

We know that Asia and Africa are older than America, and we are sure that certain animals were sent out by the Old World to the New. Some day I hope that some wise keeper of fossil animals will write down a list of the species of large mammals of North America that are

open to suspicion of having come across the Bering Strait's Bridge and settled in North America. When it is made, surely it will include these distinguished citizens:

Hairy Mammoth Elephant,
Horse, of modern type,
Wapiti,
Primeval Caribou,
White Mountain Sheep,
Bighorn Sheep,
Moose,
Musk-Ox,
Wide-Horned Bison and
Alaskan Brown Bear.

II

THE MARCH OF THE MOUNTAIN SHEEP

THERE are some men and some boys who cannot become keenly interested in things that happened years ago, and which they never can see in the movies. This means great losses to them; because through this failing of the mind they miss many thrilling dramas. Fortunate and happy are the boys and girls who can see and appreciate pictures of great things or occurrences that are described to them in words; and it is for them that I now will tell how the mountain sheep of Asia discovered and colonized western North America.

In the first place, the mountain sheep of the world are noble, upstanding, high-headed animals. They are brave-spirited and enterprising explorers, and so self-confident and capable that they deliberately choose to dwell on the high places. They brave the fiercest storms of winter, and they cross dangerous glaciers, but by way of variety some of them elect to dwell low down, even amid deserts of sand, "bad-lands," canyons, lava and fierce heat.

Sportsmen think that mountain sheep are the finest game animals in the world; and alas! no hunter of big

game feels that his experience is really complete until he has killed at least one "big ram."

Even to this day, the western mountains of North America, as far south as the northern states of Mexico, are adorned with different kinds of mountain sheep.

The migration of the different kinds of wild animals over the world is a subject of fascinating interest. The scientific men call it "the dispersal of animal life"; and they speak freely of "the migration of species." To keen students it is of thrilling interest. In a previous chapter I have done my best to tell you how the Asiatic elk, caribou and other large species came to North America over the great land bridge that Nature built across what now is Bering Strait. Now, to those who are interested I am going to tell the story of our mountain sheep, and what they left behind "in the old country" when they came to America. I will show you the cradle of the world's mountain sheep (in Asia), and a procession of species 8,000 miles long.

In Central Asia, about a thousand miles north of India, lies a wide and lofty plain called Tibet, bounded by three great mountain ranges. North of it rises the Altai range. The Tian-Shan Mountains of Turkestan are westward, and all along the south looms up the stupendous sky-high Himalayas—the "Roof of the World," and the earth's highest mountains.

Those three mountain systems, and the high, rolling plains and foot-hills between them, constitute the cradle of the genus *Ovis*—and the Sheep Family of the world.

Thousands of years ago they produced, and they contain even to this day, the largest of all mountain sheep, living or dead.

The great Siberian Argali, of the Altai Mountains of Mongolia, is the largest of all sheep, and the great-grandfather of all species. He stands 48 inches high at the shoulders, but even with that size the horns of a big ram are so enormous that the animal is almost overburdened by them. In size and in actual bulk they far surpass the horns of our largest Bighorn sheep, going up to 20 inches in circumference, and 62 inches in length.

A close second to this monster is a kind called Littledale's Sheep, of Turkestan, and the Siar Sheep of the Siar Mountains is another large one. The Turkestan sheep is a small one, apparently thrown into the scales at the last moment to make extra-good measure.

Just north of the Himalayas we find the astounding Marco Polo Sheep, with wide-spreading horns that sometimes reach the enormous length of 75 inches! Really, it is difficult to believe in such vast sheep horns until they are seen. This wonderful sheep is at home in the lofty Pamir Plateau, 150 miles in diameter, that connects the northern Himalayas with the Tian-Shan Mountains on the West. This is the region that is called by its few but hardy inhabitants "the roof of the world"; and it contains the fine sky pastures that have developed these enormous wild sheep—and several others.

With but one break, we can trace out the general line of march of an amazing mountain-sheep procession, lead-

ing all the way from Tibet and the Pamirs of High Asia clear to the Lower California peninsula. Let those who doubt it now join those who believe, while we see what we can see.

We start with a big, strong species of wild sheep called the Tibetan Ar-gal'i. It is a little larger than our Alberta Bighorn, and well fitted by nature to be a great pioneer species. In North America you will find that our Rocky Mountain Bighorn is so close a copy of it that you are due to be surprised.

When the migrating bands of Tibetan Argali left the pleateau of Tibet they elected to steer a course northeastward—probably without at all knowing why. They left at one side, westwardly, the great Siberian Argali of the Altai Mountains, and Littledale's Sheep of the Siar Mountains of Turkestan.

As the Tibetan bands of sheep pressed northeastward, one flock wandered off northward into the valley of the mighty Lena River and Mongolia, and eventually through abundant food developed differences that resulted in the Clifton Bighorn and the robust Mongolian Bighorn of to-day.

After long and wearisome travel, the pioneers reached the great Peninsula of Kamchatka; and there the smaller and weaker Argali actually mutinied. The yearling lambs said to their mothers, when they looked out over Bering Sea:

"Mother, we are tired. We long to graze and rest. Why should we travel farther? Whither are we drifting? What is the objective of the Old Ones, anyhow?"

Then the mothers put their heads together, and finally said:

"Now, you Old Ones, this thing has gone far enough! Travel is a fairly good thing, but this herd has had about enough of it for the present. We have followed you across Manchuria and Kamchatka, and here we are, at the jumping-off place. The children are tired, their hoofs are worn out until their toes are on the ground, and we are thin like the antelopes that we passed. Here we must settle down for a hundred years or so, and recuperate, before we do any more wandering. If you won't agree to that, back home we go."

"Oh, well," said the Old Ones, "if you feel that way about it, why of course we will camp here for a season."

And so it came about that a mountain-sheep colony was formed on the Kamchatka Peninsula, and spread thinly and feebly up and down the coast. But it never really throve. The winters were very long and cold, the snows were deep, the grass on the wind-swept ridges was thin and poor, and those sheep actually grew smaller instead of larger. To this day those Kamchatka Sheep are small, and their horns are small and thin. Sometimes they are found on the shore within a few hundred feet of tide-water. Except that they are gray in color, they are very much like the white sheep of Alaska.

Eventually some strong members of the pioneer band went on northward, bearing eastward along the coast until finally they reached East Cape, the last land of Asia, and literally the easterly jumping-off place of the

Old World. As the leaders paused on the shore of what is now Bering Strait, and realized that their land travel in Asia was at an end, they looked eastward across a great strip of rough land and snow—the Land Bridge leading toward America—and I fancy that this is what the leaders thought:

"Now, what is it that lies Over There? It may be delectable mountains, with more grass, and less ice and snow. Let us go and find out."

And so, eventually, they wandered timidly out upon the Land Bridge. Finding it rough but solid they kept going on and on. Finally they reached Cape Prince of Wales and the Seward Peninsula of Alaska, and again stood on a great mass of land. On those wind-swept arctic plains they found an abundance of grass, and quickly concluded that the land was good.

Bands of the smaller and weaker sheep that had been most severely pinched by the awful cold of the fierce Kamchatka region promptly headed southward, and travelled persistently in quest of milder air and less fierce winds and snow. Eventually, through long residence in western Alaska those small and delicately formed sheep began to develop snow-white coats and amber-colored horns. Thus was produced the White Sheep of Alaska, now spread over a vast area eastward to the Mackenzie basin, and southward quite into the edge of northern British Columbia. When not stained by red clay these Yukon and Alaskan White Sheep are almost as white as snow, but in form, in size and in shape of horns they are

From a drawing by E. Rungius Fulda.

THE MARCH OF THE MOUNTAIN SHEEP.

From East Cape, Asia, over the land bridge to Alaska, and northwestern Mexico. All these species are now living.

as much like the Kamchatkan Sheep as if they all had been cast in the same moulds.

Now here comes a break in the fan-shaped migration of the white descendants of the Tibetan Argali. Their stopping-places are sharply defined, but to save our lives we cannot tell why they turned dark, at certain far-distant points, and developed new species.

At all events, however, we know precisely where their trail ends. It is in the main chain of the Rockies, northern British Columbia, at latitude 57°; and if you will take your map, you can put your finger-tip on the very spot.

It is a well-known fact that whenever members of an animal species become shut off by themselves, and for many generations live in a peculiar climate, feeding upon special kinds of food, those strange and new conditions produce changes in hair, color, horns and teeth. Thus are new species developed, permanently, differing in certain particulars from the parent stock.

In the great Yukon River valley the small, snow-white sheep of Alaska with amber-colored horns went southward until they reached the Cassiar Mountains of northern British Columbia, above Telegraph Creek. There, through things different in food, drink or climate, their white hair grew darker, until at last, when discovered by civilized men, they were called Black Sheep. They are the blackest of all wild sheep, and as far as you can see them you can recognize them by their color. But they have some light markings; and on the whole they are very handsome.

Presently, a strange thing happened.

Wherever the White Sheep of the north and the Black Sheep of the south came together, they intermarried, and produced a half-breed race of mixed and varying colors —gray, white and brown—which for general convenience has been named Fannin's Sheep. It is a very fine example of a wild half-breed; and if it lives long enough it will become a strongly piebald, or "pinto," sheep. Specimens are to be seen in a few of the largest museums.

But now we must go back to Jasper House, in the northern Rockies, and take up the trail of our great American Bighorn, a species that throws back to the Tibetan Argali. From Jasper House, in Alberta, to southern Colorado this old-fashioned Bighorn is a grand animal. He is big, strong, brave and densely clothed with smoky-gray hair. Its horns are the biggest of all American sheep, sometimes reaching 17 inches in circumference, and a length of 44 inches. This first-known American species reaches its maximum size in western Alberta. Southward it goes along the Rockies through British Columbia and Alberta, Montana, Idaho, Utah, Nevada and Colorado, New Mexico, Arizona, Texas, and into the blasted volcanic Pinacate Mountains of Mexico, on the eastern shore of the Gulf of California. The Siri Mountains, still farther south, form one ending-place of the great march, where the trail stops in a land of desert heat, thirst and hunger. There the sheep are so small and lean that it is a temptation to call them Pigmy Bighorn.

In the Southwest there are three offshoot species, but they one and all so closely resemble the parent stock that only the trained zoologist can distinguish their points of difference. Nelson's Sheep is found in the Funeral Mountains of southwestern Nevada, opposite the Death Valley of California. The sheep of Lower California are slightly different; and in the northern portions of the Mexican State of Chihuahua (called Che-wah'wah) there is the true Mexican Bighorn, marked by extra-large ears.

In the National Collection of Heads and Horns of the New York Zoological Park the visitor can see mounted heads of all these species, leading all the way from Mexico back to Tibet, and on to India, Sardinia and North Africa. Study them; and remember what is printed here; for it may be of permanent value in studying the evolution and scattering of species of wild animals.

III

THE WILD ELEPHANTS OF NORTH AMERICA

"All that tread
The globe are but a handful to the tribes
That slumber in its bosom."
—"*Thanatopsis*," *William Cullen Bryant.*

IT is a good thing to be able to project our thoughts and fancies far back into the Days that Were, beyond the influence of the troublesome Days that Are. When wearied with the banditry, the accidents, the crimes and the follies of to-day, it is a pleasing diversion to look back to the days when thousands of huge hairy elephants marched majestically over our land, fearing nothing save the calamities and convulsions of Nature. We cannot say when our American elephants began—whether it was 100,000 years ago, or 1,000,000 years, but does that greatly matter? The fossil bones are almost as good as new, and some of them are so admirably preserved that they eloquently tell their story of the greatness of the Past.

From the caves of France we know that the Cro-Magnon artists of 30,000 years ago saw and personally knew living hair-clad mastodons and mammoths. But that is not all. It is now a fully accepted "scientific" fact that in the United States prehistoric men and mam-

moths actually *lived at the same time!* Even though we discard all evidence that is debatable there remain facts like these: In 1885, near Worcester, Massachusetts, a human skull and a mastodon tooth were found together in a marsh eighteen feet below the surface. Both showed that they had been carried there by running water, before the peat-bed formed above them. In 1895, at Petit Anse, Louisiana, modern man-made implements were found fourteen feet below the surface, underneath remains of an extinct elephant.

Mastodon hair has been found more than once; the last time at Escholtz Bay, Alaska. I have been told that in Paris there are now somewhere in storage (if not lost or destroyed during the war) some large pieces of skin of *a Siberian mammoth* which were described to me as "supposedly in fit condition to be mounted." No; I cannot give its street address; but its owner is said to be a French scientist who was financially able to purchase that amazing specimen a short time before the outbreak of the war, but not to mount and restore the mammoth remains since the war. I know nothing more of the matter than the report I have mentioned above.

In this period of the world's progress, we find living elephants only in the tropics of Africa, southern Asia and Borneo. None of them are clothed with hair, and none of them can endure snow and ice without real physical suffering. But we must not think for a moment that the arctic regions of North America always have been as fiercely cold in winter as they are to-day. On the con-

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trary, there is evidence that once the far-northern climate was mild, and so well stocked with food and forage plants that a great variety of wild animals—now absent—lived there in comfort. Alaska never was wholly overrun by the great North American ice-cap of the last glacial epoch.

And here is another interesting circumstance of the wonderful Past. There were times when the mastodons of New York and the mammoths and mastodons of North America, Europe and Asia were clothed with abundant hair. Furthermore, certain ancient elephants lived in the United States, Europe and Siberia at the beginning of the development of man; and the proof of this is sufficient for all ordinary purposes.

We will purposely refrain from including in this chapter the dead-and-gone elephants of other continents than our own. The Siberian mammoth will be spoken of elsewhere. And even concerning our American mammoths and mastodons, we will not attempt to set forth one-tenth of the information regarding the spread of species that the toil of the fossil-hunters has accumulated. Nor will we undertake to follow any of our subjects into Mexico. Thus we leave untouched a wide field for those who now wish to go out hunting for the elephants of the Past; and truly, the chase is worth while. As a guide-book I refer the leader of the safari to Professor Henry Fairfield Osborn's *Age of Mammals.*

Although our continent contains to-day a fine assortment of large wild animals, ranging all the way from the

burly bison and the giant moose down to the lively and beautiful little swift fox of the plains, the entire lot is a trifling exhibit beside the many and gigantic species that lived here in the past, and died and disappeared long before America was discovered. Year by year, slowly and painfully, fossil remains of the vanished species are dug up, chiselled out of their enveloping rock or soil, mounted and placed in the natural history museums.

It makes one a bit dizzy to think that gigantic elephants once roamed over the beautiful green hills and dales of New York, Pennsylvania, Kentucky and the Middle West, and the whole of the Far West, even to the sounding shore of the Pacific.

But this was not all.

Our species of American elephants had representatives wandering all along the Pacific Coast from central Mexico and southern California to northern Alaska. We have long known about the mammoth remains found on the shore of Escholtz Bay, Alaska, but many minds have been a bit hazy about the "farthest north" of our own elephants.

One fine day I received a mysterious package by mail that had made a long, long journey to reach me. It was from my old friend Charles D. Brower, of Point Barrow, Alaska—our most northern point of land,—and it contained two huge molar teeth, one from a dead-and-gone mammoth, the other from a *mastodon!* Both had been found near Point Barrow, only a few miles from the shore of the Arctic Ocean. A little later they were followed by

the perfectly preserved fossil skull of a horse that was surprisingly similar to the domestic horse of to-day.

One of these molar teeth proved that even our American mastodons once lived in Alaska, close up to its farthest point of land!

A little farther back I used the words "gigantic elephants"; and by them I meant elephants far larger than any now living. When a mounted mammoth *skeleton* stands 13 feet high at the shoulder, it means that the living animal was indeed *a giant among elephants*, and probably stood 14 feet in his stocking feet.

The largest Indian elephants are a few inches over 10 feet in height at the shoulders, and the tallest African elephants are a few inches over 11 feet. In shoulder height and bulk the American mastodon was practically of the same size as the Indian elephant of to-day. The tusks of the Indian elephant are but little curved, and very rarely reach a length of 8 feet. The tusks of the largest African elephant of to-day rarely reach a length of 9 feet, and the greatest known length, 11 feet 5½ inches, is found in the great pair in the National Collection of Heads and Horns, New York.

The tusks of the largest mammoth species, at their very largest, run from 10 to 12 feet, but of 12-foot tusks only one pair is known. In bulk and in weight I estimate that the largest mammoth runs about one-fourth larger than a really big African elephant of to-day —about 10,000 pounds—and one-third larger than a commanding Indian elephant, of about 8,000 pounds.

Now, here is a bit of most interesting testimony from the rocks, that man himself placed there for us, about 30,000 years ago, in certain caves in France. The Cro-Magnon artists of that far-back time drew on those smooth rock walls and ceilings many very good pictures of mammoths, and they always showed them covered with long hair. Those pictures tell us why our mammoths and mastodons could live in Alaska. They were not naked, as our living elephants are; and their coats of hair kept them from freezing. We know most positively that, like the musk-ox, the mammoths had two fur coats, a dense and woolly undercoat for warmth, and an outer coat of long, straight hair to shed rain and snow.

But it was not mammoths alone that through a long cycle of years went marching up, down and across North America from Florida and Los Angeles to Nome and Point Barrow, over a total "stamping-ground" far greater than that of the American bison. Within that area, embracing practically the whole of the United States and south-central Canada, stalked the mastodon, as genuine an elephant as our big friend, the mammoth. I have named his range as I heedlessly *thought* it was—until that molar tooth came down from Point Barrow; and then, presto! for me the range of the mastodon suddenly shot northward, like a trunk thrust out from an elephant's head.

It now seems almost proved that the mastodon was covered with hair, and we know that it had a good outfit of strongly curved tusks. One very plain and unmis-

takable difference between the mammoth and the mastodon was found in their molar teeth. In the former the tooth has a broad, flat crown with a series of slightly raised ridges of hard enamel running across it, evenly spaced. The grinding surface of the mastodon molar is finished with four or five great mountain ranges running crosswise, with deep, V-shaped valleys between them. The smooth surface of the mammoth tooth is for grinding, millstone fashion, and the mastodon molar is for cutting and crushing only.

Very large and also remarkably perfect mammoth skeletons have been found in Indiana, Texas and southern California. Two stand in the American Museum of Natural History at New York, and the third giant (12 feet high!) is in the Museum of Los Angeles.

The most famous American mastodon specimens were dug up in Ulster and Orange Counties, New York. The "Warren Mastodon" has been known ever since its discovery by the name of its founder, and you can find its mounted skeleton in the American Museum of Natural History. In the State Museum at Albany stands a life-size restoration of a mastodon, executed and unveiled in 1922. It looks like a living hairy elephant, and all of the intelligent people of America should see it at least once. Its picture has appeared in a few newspapers, but I fear that as yet its fame has not travelled far; which if true is unfortunate.

Between the low granite and gneiss rock ridges that run so plentifully through Orange and Ulster Counties, New

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THE AMERICAN MASTODON.

Restored and drawn by Charles R. Knight.

York, are many low meadows, bogs and ponds. I am personally acquainted with several New York bogs, and I know a little of their vast depths of soft mud and peat-like muck. Some of them abruptly plunge off from hard banks and sink to depths profound—an arrangement well adapted to entrap an animal even as wise and wary as an elephant, an elk or a man.

Into these New York bogs many a hungry but unwary mastodon ventured in quest of food plants and drinks, became mired down, perished, and so rapidly sank out of sight in the water and mud that even the wolves and bears had not time to tear them to pieces and scatter their bones. There their skeletons lie to this day, just as the Cohoes individual lay at rest until its bones were found by ditch-diggers. In another chapter we will have the story of the great tragedy in the La Brea pitch lake of Los Angeles, and the engulfment therein of mammoths, lions, sabre-toothed tigers, bears, wolves and other animals of astounding kinds and numbers.

The elephants of America lived on a mixed diet of green vegetation, just as the wild elephants of India do to-day, such as leaves that taste good, rank grass and water plants. To this were added great quantities of fir-tree foliage, and probably much other foliage of evergreen trees such as juniper, young pine, spruce and all the arbor vitæ species available.

IV

THE FROZEN MAMMOTHS OF SIBERIA

"Gigantic and proud, o'er that visiting crowd
A Mammoth loomed, hairy and vast.
Incredibly tall in that museum hall
He stood like a Sphinx of the Past.

With wonderful length from that mountain of strength
His tusks reached far out into space.
His trip-hammer feet were for him truly meet,
But his legs lacked the outlines of grace."

—*Old-Fashioned Verses.*

THE great hairy-and-woolly elephant, long known to the world as the mammoth, links Man up with the Past more closely than do any other of the dead-and-gone animals. As briefly mentioned on a preceding page, about 30,000 years ago there lived in France a high-class race of primitive men who loved art and wild animals, who could draw excellently, and also model animals in a crude way. They are now known to the world as the Cro-Magnons (pronounced man'yons), and the artists among them drew on the smooth rock walls and ceilings of numerous caves many excellent outline drawings of mammoths, rhinoceroses, bison, reindeer and wild boars.

It is accepted as a fact that those men pictured only animals that they saw alive; which brings all those species

down to the actual age of Barbaric Man. It is quite proper for us to accept 30,000 years ago as the period wherein the Cro-Magnon man and the mammoth lived together in western Europe.

But the world is wide. There were several species of mammoths, and they roamed over immense areas in Europe, Asia and North America. In fact, they inhabited nearly the whole of the more northern regions of those continents. In Europe they went down into Italy as far south as the Tiber. In Asia, in what is now Siberia, they fairly swarmed.

In North America they inhabited western and central Alaska, the western half of Canada, practically all of the United States, and on down through central Mexico to the City of Mexico itself.

In Siberia so many ivory tusks of the Siberian mammoth have been dug up in the tundras and forests and dredged out of the Arctic Ocean that for many years "fossil ivory" formed an item of importance in the ivory markets of the world.

It looks very much as if the original stock of mammoths had developed in Central Asia, boldly ranged northward into Siberia, and there developed long and abundant hair. That hair was of two kinds—fine wool next to the skin for warmth, and an outer rain-coat of long, coarse hair that sometimes resembled bristles, as a thatch to hold off snow and ice and rain. Having found abundant food in Siberia, of the foliage of the pine, spruce, fir, other hardy green things and tundra plants,

the ever-increasing mammoth herds migrated westward into and through Europe, and eastward across Kamchatka, across the great Land Bridge from Asia to America, and finally throughout North America as indicated. Many fossil skeleton remains of mammoths, and some of them excellently preserved, have been found in the United States at the following places: Washtucna Lake, Washington; Afton, Oklahoma; Ohio, near Cleveland; Potter Creek Cave and Rancho La Brea (Los Angeles), California; Big Bone Licks, Kentucky; Rock Creek, Texas; Silver Lake, Oregon Desert; and in Logan County, Kansas.

In the United States the existence of mammoth and mastodon fossil bones either associated with or actually above evidences of man really leaves no room to doubt that man and those two elephant types lived in North America at the same time. The evidences accumulated up to date are to most persons quite satisfactory. Unfortunately in North America, the earliest races of men did not distinguish themselves by leaving permament records of their activities, nor of the wild animals with which they struggled or fought for food and a place in the sun. Among their various earth mounds one has been found in Wisconsin which now is known by its shape as the "Elephant Mound."

Several wonderfully complete and perfect skeletons of mammoths have been found, in California, Texas and Indiana, and now are to be seen in the museums of New York, Los Angeles and elsewhere. They are the most

commanding and awe-inspiring of all American elephant remains.

Between 1878 and 1892 Professor Henry A. Ward caused to be made at his Natural Science establishment at Rochester, two very striking and really excellent restorations of a Siberian mammoth of maximum size. One was shown at the Chicago World's Fair and the other stands in the museum of the University of Virginia, at Charlottesville.

But, wonderful as these remains are, there have been other discoveries that bring still more closely the Days that Were to the Days that Are.

In northern Siberia several frozen mammoths have been found, almost entire in the flesh, and clothed with their own skins and hair. The flesh of two of them was so fresh that it was eaten by the dogs who helped to discover them. In at least one case native men of extra-tough fibre who were among those present also tackled it—but with rather poor success.

The first specimen of the frozen mammoth series was partly preserved and made known to the world by an enterprising and appreciative Englishman named Adams, and that find very properly has gone down in history as the "Adams Mammoth." Its mounted skeleton was found at the mouth of the Lena River, already in process of being devoured by dogs, bears and wolves, and one hind leg had entirely disappeared. This discovery gave to the world its first information that the mammoth was clothed in a warm suit of hair of two kinds.

In 1843, a Russian naturalist-explorer named Middendorf, found a second frozen mammoth near the Arctic Circle, between the Obi and Yenesei Rivers, and its preserved eyeball is now in the Petrograd Museum. In the same year a young specimen was found on the River Taimyr, in latitude 75° 15′.

The fourth find was in some respects the most important of all, and nothing could be more intensely dramatic than the way it happened. The event occurred in 1846, but it was not until 1868 that a celebrated British geologist, Professor W. Boyd Dawkins, translated an eyewitness account of it and gave it to a very small section of the English-speaking world. Ever since 1868 until now this classic of zoological discovery has lain buried in an obscure and forgotten magazine, and Doctor William K. Gregory has obtained it for me from the Osborn Library of that great storehouse of zoology, the American Museum of Natural History.

But to the story of stories. Inasmuch as it would be both foolish and wrong for any one to attempt to relate that thrilling occurrence in his own words, I will copy verbatim Professor Dawkins's translation of it.

The story was related by a young Russian engineer named Benkendorf, employed by his government in a survey of the coast of Siberia off the mouth of the Lena and Indigirka Rivers, and who went up the latter in a small iron steam cutter, to make surveys and soundings, and map the layout. This is the narrative:

"In 1846 there was unusually warm weather in the

north of Siberia. Already in May unusual rains poured over the moors and bogs, storms shook the earth, and the stream carried not only ice to the sea, but also large tracts of land thawed by the masses of warm water fed by the southern rains. . . . We steamed on the first favorable day up the Indigirka; but there were no thoughts of land. We saw around us only a sea of dirty brown water, and knew the river only by the rushing and roaring of the stream. The river rolled against us trees, moss, and large masses of peat, so that it was only with great trouble and danger that we could proceed.

"At the end of the second day, we were only about forty versts up the stream. Some one had to stand with the sounding-rod in hand continually, and the boat received so many shocks that it shuddered to the keel. A wooden vessel would have been smashed. Around us we saw nothing but the flooded land. For eight days we met with the like hindrances until at last we reached the place where our Jakuti were to have met us. Further up was a place called Ujandina, whence the people were to have come to us, but they were not there, prevented evidently by the floods. As we had been here in former years, we knew the place. But how it had changed! The Indigirka, here about three versts wide, had torn up the land and worn itself a fresh channel, and when the waters sank we saw, to our astonishment, that the old river-bed had become merely that of an insignificant stream. This allowed me to cut through the soft earth, and we went reconnoitring up the new stream, which had worn

its way westward. Afterward we landed on the new shore, and surveyed the undermining and destructive operation of the wild waters, that carried away, with extraordinary rapidity, masses of soft peat and loam.

"It was then that we made a wonderful discovery. The land on which we were treading was moorland, covered thickly with young plants. Many lovely flowers rejoiced the eye in the warm beams of the sun, that shone for twenty-two out of the twenty-four hours. The stream rolled over, and tore up the soft wet ground like chaff, so that it was dangerous to go near the brink.

"While we were all quiet, we heard under our feet a sudden gurgling and stirring, which betrayed the working of the disturbed water. Suddenly our *jäger*, ever on the lookout, called loudly, and pointed to a singular and unshapely object, which rose and sank through the disturbed waters. I had already remarked it, but had not given it any attention, considering it only driftwood. Now we all hastened to the spot on the shore, had the boat drawn near, and waited until the mysterious thing should again show itself.

"Our patience was tried, but at last, a black, horrible, giant-like mass was thrust out of the water, and we beheld a colossal elephant's head, armed with mighty tusks, with its long trunk moving in the water, in an unearthly manner, as though seeking for something lost therein. Breathless with astonishment, I beheld the monster hardly twelve feet from me, with his half-open

Drawn from the story of an eye-witness, by E. Rungius Fulda.

THE FROZEN MAMMOTH OF THE INDIGIRKA RIVER, SIBERIA.

The front feet are free, but the hind feet still are frozen fast to the bottom.

eyes still showing the whites. It was still in good preservation.

"'A mammoth! a mammoth!' broke out the Tschernomori, and I shouted, 'Here, quickly! Chains and ropes!' I will go over our preparations for securing the giant animal, whose body the water was trying to tear from us. As the animal again sank, we waited for an opportunity to throw the ropes over his neck. This was only accomplished after many efforts. For the rest we had no cause for anxiety, for after examining the ground I satisfied myself that the hind legs of the mammoth still stuck in the earth, and that the waters would work for us to loosen them. We therefore fastened a rope around his neck, threw a chain round his tusks that were eight feet long, drove a stake into the ground about twenty feet from the shore, and made chain and rope fast to it.

"The day went by quicker than I thought for, but still the time seemed long before the animal was secured, as it was only after the lapse of twenty-four hours that the waters had loosened it. But the position of the animal was interesting to me. It was standing on the earth, and not lying on its side or back as a dead animal naturally would, indicating, by this, the manner of its destruction.

"The soft peat or marsh land on which he stepped thousands of years ago, gave way under the weight of the giant, and he sank as he stood on it, feet foremost, incapable of saving himself; and a severe frost came, and turned him into ice and the moor which had buried him. The latter, however, grew and flourished, every summer

renewing itself. Possibly the neighboring stream had heaped over the dead body, plants and sand. God only knows what causes had worked for its preservation. Now, however, the stream had brought it once more to the light of day, and I, an ephemera of life compared with this primeval giant, was sent here by heaven just at the right time to welcome him. You can imagine how I jumped with joy.

"During our evening meal, our posts announced strangers. A troop of Jakuti came on their fast, shaggy horses. They were our appointed people, and were very joyful at sight of us. Our company was augmented by them to about fifty persons. On showing them our wonderful capture, they hastened to the stream, and it was amusing to hear how they chattered and talked over the sight. The first day I left them in quiet possession, but when, on the following, the ropes and chains gave a great jerk, a sign that the mammoth was quite freed from the earth, I commanded them to use their utmost strength and bring the beast to land. At length, after much hard work, in which the horses were extremely useful, the animal was brought to land, and we were able to roll the body about twelve feet from the shore. The decomposing effect of the warm air filled us all with astonishment.

"Picture to yourself an elephant with a body covered with thick fur, about 13 feet in height, and 15 in length, with tusks 8 feet long, thick, and curving outward at their ends, a stout trunk of 6 feet in length, colossal limbs of 1½ feet in thickness, and a tail, naked up to the

end, which was covered with thick tufty hair. The animal was fat, and well grown; death had overtaken him in the fulness of his powers. His parchment-like, large, naked ears, lay fearfully turned up over the head. About the shoulders and the back he had stiff hair, about a foot in length, like a mane. The long, outer hair was deep brown, and coarsely rooted.

"The top of the head looked so wild, and so penetrated with pitch (und mit Pech so durchgedrungen), that it resembled the rind of an old oak-tree. On the sides it was cleaner (reiner), and under the outer hair there appeared everywhere a wool, very soft, warm, and thick, and of a fallow-brown color. The giant was well protected against the cold. The whole appearance of the animal was fearfully strange and wild. It had not the shape of our present elephants. As compared with our Indian elephants, its head was rough, the brain-case low and narrow, but the trunk and mouth were much larger. The teeth were very powerful. Our elephant is an awkward animal; but, compared with this mammoth, it is as an Arabian steed to a coarse, ugly, dray-horse. I could not divest myself of a feeling of fear, as I approached the head; the broken, widely opened eyes gave the animal an appearance of life, as though it might move in a moment and destroy us with a roar. . . .

"The bad smell of the body warned us that it was time to save of it what we could, and the swelling flood, too, bade us hasten. First of all we cut off the tusks, and sent them to the cutter. Then the people tried to hew

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the head off, but notwithstanding their good-will, this was slow work. . . . I had the stomach separated, and brought on one side. It was well filled, and the contents instructive, and well preserved. The principal food consisted of young shoots of the fir and pine; and a quantity of young fir cones, also in a chewed state, were mixed with the mass.

"As we were eviscerating the animal, I was as careless and forgetful as my Jakuti, who did not notice that the ground was sinking under their feet, until a fearful scream warned me of their misfortune, as I was still groping in the animal's stomach. Shocked, I sprang up, and beheld how the river was burying in its waves our five Jakuti, and our laboriously saved beast. Fortunately, the boat was near, so that our poor work-people were all saved, but the mammoth was swallowed up by the waves, and never more made its appearance."

Now, is not this a fine, clear and complete story of a perfectly amazing animal from The Past! To begin with, the occurrence represented one lucky chance out of ten million, and developed as the most colossal coincidence that ever occurred in the history of wild animals. Engineer Benkendorf was at precisely the right spot—out of all the vast area of Siberia—at precisely the right moment, and with an outfit of fifty men to assist him in landing and handling the resurrected monster so strangely risen from his frozen tomb 30,000 years old. Nature said:

"Oh, puny man, look! I will give you one brief but

vivid view of the greatest land mammal of the past. Use well your eyes and your brain; write down what you see, and give it to the world; for I may never again lift the curtain on another exhibit such as this."

Engineer Benkendorf was a man with seeing eyes, a nimble brain, and an industrious pen. Are we not glad that he was the one chosen by Fate to be there, instead of a sordid soul, thinking only of the value of the ivory, and unwilling to touch a smelly dead animal? Verily. He looked as sharply and wrote as clearly as a well-trained newspaper reporter of to-day; and this is saying a lot. Even though Nature and the relentless elements snatched away the remains of that mammoth immediately after it had been carefully examined, the imperishable pen picture of its appearance in full flesh remains with us forever.

The body of that dead mammoth was swept out to sea, and it found a new grave in the shallow shore waters of the Arctic Ocean, where the rivers of Siberia continually are dumping new soil and building up new lands to be added to the northern rim of Asia. From those same shallow waters Russian fishermen have hooked and hauled up scores and scores of mammoth tusks, and sold them in the ivory market, for billiard-balls, piano-keys and knife-handles. Those tusks from the Arctic Ocean tell the story of other mammoths whose dead bodies were washed down from the interior of Siberia and carried out to sea by the mighty Lena, the Obi, the Yenisei and many smaller rivers that have a way of growing large in freshet times.

The tundras and foot-hills of northern Siberia have yielded thousands of mammoth tusks. One pair was a little over 12 feet in length. A few small tusks were almost spiral in form. In one place long, long ago there was discovered a pile of mammoth tusks evidently dating far back into the past, indicating that prehistoric man appreciated the value of ivory, and sought to collect and preserve it from becoming lost through neglect.

In order to make this mammoth chapter complete, Mr. Herbert Lang, of the American Museum of Natural History, kindly placed in my hands the highly interesting original record of Otto Herz of the last Siberian mammoth found in the flesh. Mr. Herz writes as an eye-witness and a participant in the final unearthing and preserving of this specimen, and an illustrated translation of his report appears in the Report of the Smithsonian Institution for 1903. It is known as the Beresowka Mammoth, because it was found in the icy cliff wall of a small river of that name, which is a tributary of the much larger Kolyma River in northeastern Siberia. The exact locality cannot be made clear to the reader without the aid of a large map, but it was at latitude 67° 32′, and east longitude 126° 25′ (meridian of St. Petersburg). It is about 800 miles west of Bering Strait and 60 miles north of the Arctic Circle.

The Beresowka mammoth, which for convenience we may as well call the "last one," was found in 1900 by Lamut natives, who sold their rights to a wide-awake Koblynsk Cossack officer named Javlovski. It was buried

in a layer of ice at the foot of the perpendicular side of a bank facing a washed-out river-bed. On the level ground above it grew a struggling, straggling forest of moss, small pines and fir trees.

After having briefly examined his odd purchase, Officer Javlovski hurriedly reported it to St. Petersburg, but before he had time to cover its exposed portions with earth and stones, he was taken ill and so forced to leave it exposed for several months. During that period the bears, wolves and the elements did the exposed portions much harm.

When first discovered the top of the head and the exposed upper surfaces of the body were in a fair state of preservation. The preserved portions of the head, back and legs, even from the toes upward, were covered with the usual coat of brown, woolly hair next the skin, 25 to 30 centimetres long, and coarse bristly hair 12 centimetres long on the top of the head, cheeks and neck, back and other points. By the time a party of Russian zoologists, headed by Otto Herz, had been sent to the spot by the Russian Government, a year had elapsed. The party of preservers reached the slowly decomposing mammoth on September 9, 1901.

Mr. Herz declares that evidently the mammoth fell into a pit or crevasse of ice while feeding (because food was found between his jaws), in a forest then thinly overlying the glacier. His right fore leg had doubled under him, and with his free left fore leg his struggles to escape were unavailing.

The Beresowka mammoth was not fully grown, and the tusks were small. But little of the original flesh and skin remained. The wild beasts had devoured all the best of the flesh, and torn to pieces much of the skin. All around the mammoth the ground was strewn with bunches of woolly, brown hair and "bristles." However, the collectors secured the most perfect and complete mammoth skeleton ever obtained in the Old World. They also preserved several large pieces of skin with the hair upon them, many bundles of wool and long hair, and the eyes, tail, blood, flesh, many soft parts of the internal anatomy, and 27 pounds of food from the stomach. The ears were small, and the tail was exceptionally short. The trunk, however, and practically all of the upper parts of the head save the eyes were missing, and chargeable to the wolves of Siberia. One piece of skin weighed 470 pounds, and there were hundreds of pounds of flesh.

The skin on the right shoulder was 23 millimetres thick. The length of the hair was as follows: On the chin and chest, 36 centimetres, and possibly originally 50; on the left cheek, 23; some of the under wool, 35. The shoulders bore the longest hair of all, and there it resembled a mane. A layer of fat 9 centimetres thick was found under the skin, white, spongy and odorless.

"The flesh from under the shoulder," says Mr. Herz, "which is fibrous and marbled with fat, is dark red in color and looks as fresh as well-frozen beef or horse-meat. It looked so appetizing that we wondered for some time whether we should not taste it, but no one would take it

into his mouth, and horse-flesh was given the preference. The dogs ate up whatever mammoth-meat we threw to them."

Thus did Mr. Herz lose the chance of a lifetime to eat broiled mammoth steaks from Mother Nature's refrigerator.

If all the world has been thrilled by coming in contact with the burial trappings and mummied remains of Tut-Ankh-Amen, the Egyptian king who died about 3,200 years ago, then what would be your sensations, and mine, on handling the fresh meat of a mammoth who lived and died 30,000 years ago? The mind must make an effort to grasp the full significance of those conditions. If he could know the chronology of frozen mammoth flesh, surely the brain of any Siberian wolf gnawing at it would grow dizzy in trying to bridge the chasm of elapsed time between the beginning of that cold-storage episode and its ending. And yet, many times over, wolves and bears, and more than once tough-fibred men, have eaten the flesh of frozen mammoths in Siberia, and lived to tell the tale.

V

THE GREATEST WILD ANIMAL TRAGEDY

I—The Setting of the Stage

THE earth is the mother of us all. She gave us birth, she nourishes us, and finally, when the joys and sorrows of Life have worn us out, she will take us again to her breast, and give us long and peaceful sleep. Is not the thought rather comforting?

The earth is a great treasure-vault of riches. Her stores of water, metals, coal, oil and gas keep half the world from freezing, and turn all the wheels of industry.

When I was a young man, the hand of Fortune led me to one of Nature's strangest storehouses, in the beautiful tropical island of Trinidad, opposite the northeastern corner of South America. I visited a lake of asphalt that had formed around several openings through which the warm, half-liquid material was being forced up by natural pressure, from somewhere far down in the hot bowels of the earth.

Around the outer edges of that Pitch Lake the asphalt had hardened, and even then the Barber Asphalt Company was cutting it out like blocks of shiny black ice, to melt it up in Washington, mix with it hot sand and lay it into new and strange pavements of marvellous smoothness and elasticity.

In the centre of the lake the warm asphalt was slowly

boiling up, black as ink, and sticky beyond compare. I found that there was nothing else on earth half so sticky as that pitch. Once upon your hands or your feet, nothing but powerful chemicals could remove it.

Over the slightly hardened level surface of that black lake there lay a network of narrow lanes of water, from one to three yards wide, but mostly narrow enough to be cleared by jumping. And this water, with the fringe of green bushes that circled all around that weird and uncanny lake, made the spot a peaceful and pleasant place to look upon. But beware of stepping into that soft pitch!

A few years after that visit to Trinidad's Pitch Lake, I gazed down into the pits of hard and dry asphalt that were being dug in a level plain midway between Los Angeles and the Pacific shore, on what once was the La Brea Ranch. There I saw deft-handed workmen slowly and carefully digging out thousands of black bones of wild animals, great and small, that had become entombed there in vast masses. Thirty thousand years ago that La Brea asphalt lake undoubtedly was like the Trinidad Pitch Lake of to-day!

The story of the wild-animal tragedy then enacted on that five-acre stage, bordered by arid-land bushes, is thrillingly told by the black bones from the pits; and a small portion of that story will now be revealed to the young reader who cares to forego "the movies" long enough to read it. That fearsome story of the Past has been so plainly told by the pick and shovel that the

imagination is called upon for very little service. Real bones leave little room for argument.

We have all heard vague rumors of the "great glacier" of North America, and the "glacial epoch"; but we never have done much about them. They had work to do, and they did it, without making any fuss about it. Some say that the record-breaking ice-cap that once covered all Canada and part of the United States was in places a mile in thickness; and if we believe the glacier story at all—as we really must—we may as well believe that, for good measure.

At all events, one effect of the great glacier was to crowd southward before it a vast array of long-legged and hair-covered wild animals that were fit for long-distance travel, and objected to being frozen. Naturally, the mountain sheep, giant bison, cave bears, wolves, foxes, mammoths, mastodons and camels whose forefathers had crossed the Bering Strait bridge from Asia to America, were forced southward by the cold that converted a once innocent Alaskan glacier into a calamitous polar ice-cap. On the Pacific side of the United States the ice-cap reached a long finger down through Washington and Oregon, and another came down the Rockies to the New Mexico line.

Southern California, always bright, balmy and hospitable, presently became densely populated, first with her own native species of animals, and later on many others that were forced down from the north. To the travel-worn hairy mammoths, wide-horned bison, wolves

and big bears of the inhospitable North it was a paradise. What mattered the Colorado and Mohave Deserts, so long as a Garden of Eden lay between them and the sea! Where could there be found on this earth water more clear, or leaves and grasses more sweet? In southern California wild animals gathered in such kinds and numbers that it must have seemed like the greatest collection of species ever found at one time in one small area.

On a certain day of a year unknown an earthquake was started under the bed of the Pacific Ocean, by water that leaked through the ocean-bottom into the fires far down below, and created superheated steam of tremendous explosive power. Midway between Mount Low and the Pacific shore, at what is now the Rancho La Brea, the crust of the earth was cracked open, and up through the fissures thus made came creeping hot springs of black asphalt. That material was a rich by-product of the lakes of oil which are now marked out on the western plain of Los Angeles County by forests of tall derricks, some living, many dead. From the living there comes to us gasolene with an asphalt base, to make the wheels of joy and sorrow whirl around with dizzy speed.

II—The Great Drought in California

For a long period southern California existed as a wild-animal paradise. The winter rains from off the Pacific fell regularly and abundantly. The springs bubbled, the rivers ran, the grass grew and the bushes and trees bore abundant leaf food for the great beasts. The plant-feed-

ing animals multiplied, and the lions, sabre-toothed tigers and bears that fed upon them waxed numerous and great.

But Fate has decreed that no earthly paradise may forever endure. The balance of vigorous Nature is best sustained by striving, and the destruction of surplus animal life. At last the time came when the southern half of California found itself in the throes of a great and terrible thirst.

For two seasons in succession the regular winter rains from the Pacific had been very meagre, and the third one had almost totally failed. Throughout a vast region the streams had dried up, and the sandy and gravelly earth had been baked hot and hard. Only the indestructible and fire-proof desert vegetation had survived. The once green spots in the heads of mountain gorges and canyons, where springs once gushed forth and sent down their streams, were dry, brown and lifeless; and sometimes even the places of the springs had been forgotten. The timber-clad hills and the brush-filled plains were funereal brown or gray, and leafless.

The number of large wild animals that then perished of heat, thirst and famine never will be known to man. It is the way of Nature to destroy as promptly as possible even the skeletons of animals that lie exposed upon the earth. Only those promptly buried by water in river sand, gravel or soil have survived; but they tell the story of the animals of the past, centuries after their grave-clothes have turned to stone.

In man's struggles with Nature in her angry moods

the loss of water is harder to bear than the loss of food. To die of slow hunger is indeed terrible, but to perish from thirst and heat is much worse. We will not dwell upon those tortures. All the world knows that while a man or an animal can stolidly endure the pains of hunger until at last the slow end arrives, prolonged thirst and heat quickly produce fever, madness, collapse and death. Men and animals travel, strive and fight for life-giving water as they never do for food alone.

From Santa Cruz to the San Bernardino Mountains and the Sierra Madre barrier range, the drought held southern California in a strangle hold. Some of the wild animals began to travel with faltering limbs, but others with the frenzied energy of despair. Mountains and plains alike were searched for seeping springs, for ponds and for water-holes that might not yet be wholly dry.

Finally, from the central mountains there went westward a general movement toward the salty sea. It overran the low and once grassy coastal plain of Los Angeles. Perhaps the animals felt instinctively that even at the last chance those interior marshes might yield both water and food. As usual in all great migrations of wild animals, fang and claw followed hoof and horn.

III—The Mammoth's Quest for Water

Down from the picturesque hills north of the now beautiful San Fernando Valley, heading southward in obedience to the blind instinct of thirsty animals, came a scattering contingent of the thirsty and hungry.

Hot, thirsty and red of eye, old Ganesa, the uncrowned king of the hairy mammoths of California, swung his vast bulk along the northern bank of the dry and dusty bed of the River Santa Clara of the South. At his heels, blindly and obediently following his lead, marched his consort Constance, who during 60 years of good and evil had faithfully followed him all the way from Mount St. Elias to that final Land of No Rain. After Ganesa and Constance, foot-sore, leg-weary and sorely distressed there struggled along their little son Esau, only 7 feet high, and with tusks only 4 feet long. Esau the Kid occasionally emitted through a hair-clad trunk that looked like a giant caterpillar, a shrill nasal squeal of complaint and protest; for he was nearly all in. Esau was born on a glacier in British Columbia, while his parents were migrating southward before the torrents of snow, sleet and ice of a particularly severe post-glacial winter.

Beyond reasonable doubt that lumbering trio of flesh-and-blood mountains, following down the northern bank of the Santa Clara River must have crossed the very site of the hacienda now known as the Camulos Ranch, and once the home of Ramona! Now the beautiful orange groves of the present ranch reach down to the river-bank, and lie squarely across the path of all animals heading eastward along the bank of that stream.

But the dry Santa Clara river-bed is a cheerless sight. Its width of 300 feet is a level expanse of water-worn, round and shiny cobblestones set in hot sand and gravel, or piled en masse. As we looked upon it last winter, mile

after mile, I felt profound pity for the wretched animals from Santa Barbara who found it waterless, and hot as an oven.

With an occasional pause by Ganesa and his wife to rest the Kid, the trio marched up the valley, for better or for worse. Their 6-inch-long coats of coarse brown hair, with a fine and warmer coat underneath, were all right for Alaska, but in California they at once became a fearful burden. Gladly would they have shed them forever, had it been possible. Old Ganesa's magnificent 11-foot tusks of gleaming white ivory, thrusting far out, then curving high up and back again, also were a handicap. Once they were his defense, his pride and his joy. Now, he gladly would have traded them for just one poor barrel of dirty water with which to moisten his superheated interior.

In the San Fernando Valley Ganesa and his family spent a most uncomfortable night. At earliest dawn they resumed their march; and then an important incident occurred. As they arrived opposite the northern end of what now is Laurel Canyon, which cuts clear through the high and steep Los Angeles mountain range, a cool breeze struck them, coming through the gap. Instantly old Ganesa stopped, cocked his ears straight out from his head and glared up the canyon. A gray cloud of fog, cool, and certainly carrying moisture, bore down upon him, and enveloped him and his family.

Did it create a sensation? Truly, it did. The deep rumble of surprise and satisfaction that issued from

Ganesa's massive chest was like the first thunder-rumble of a coming storm. "This," said Constance, "is something like water!" The Kid's impatient squeak plainly said: "Go to it!"

At once Ganesa swung a quarter-circle to the right, and headed for the mouth of the Laurel Canyon.

The broad, smooth road that is there to-day was not there then. Instead, there was a rugged, rocky and V-shaped stream-bed, jealously hemmed in by steep-sided and lofty hills, rocky and almost bare of plant and bush life. Like the good engineer that he was, the old mammoth looked about for the best route, and soon found it. On the left there rose a very consistent north-and-south ridge, with a summit so reasonable that travel along it looked inviting.

To its top the three mammoths scrambled with some difficulty, to find there a very distinct game trail leading southward through the range. It led right up to the highest point of the pass, and with my mind's eye I can see quite well just how those three big beasts looked as they marched along it toward they knew not what. The moisture-laden fog continued to pour through the pass, and besides the relief it afforded, it was a definite promise of water somewhere farther on.

The mammoth family reached the summit, and there they lost their friendly ridge. It was then a rough but necessary evil, but now useful as part of the scenario of an excellent modern road.

As the gigantic elephants paused on a high bench of

the foot-hills and overlooked the site of the now beautiful city of Beverly Hills, the rough plain of Los Angeles spread out below them like a dull gray map. Over yonder on the distant right, six miles westward, it faded into the gleaming ocean. The outlook was far from promising. All the land was a gray and melancholy waste; and the shimmering heat waves that rose from it required for their penetration a long and steady gaze.

Old Ganesa stood full 13 feet high at the shoulders, and much of his hair was 18 inches long. I can see him now—in my mind's eye—and what stupendous motion-pictures he and his family would have made, had they not lived too soon for Hollywood! As he paused to look for water, his family pushed up close beside his hind quarters, breathing heavily, and dumbly stood still. Now we see for the first time how gracefully Ganesa's marvellous tusks of solid ivory curve upward, outward and inward throughout the outer half of their length. The tusks of Constance are only 8½ feet long, and less curved.

As the three mammoths gazed southward they noticed over a certain central spot in the plain, and only two miles from their lookout, a great many large birds that were slowly flying in endless circles. To-day we know that the huge black ones were California condors, and that the smaller ones, of equally majestic flight, were golden eagles. Still nearer on the plain Ganesa saw the forms of several animals moving forward, all of them solitary save one pack of gray wolves; and all of them

were headed toward the same point—the pivot point of the circling birds.

Now, it is a rule of the wilderness that whenever a thirsty grass-eating animal spies another grass-eater travelling steadily forward and in a straight line, the observer thinks: "That one is seeking water!" Had Ganesa or his consort possessed the keen vision of the mountain sheep, they would then and there have seen the gleam of sunlight striking upon water!

They saw not that tell-tale gleam, but they did see the condors circling in the air at nearly their own level; and their wild-animal instinct told them of something to be investigated with despatch.

IV—The Black Death-Trap

With a resonant, bull-like bellow issuing from the depths of his gigantic chest, the old tusker set off down the hillside, pointing for the pivot of the circling birds; and his wife and son swung forward into line on his trail.

In brief time the far-striding trio observed on their left flank a huge red-maned lion striding forward on a course that seemed to aim at the same point as their own. But this was no cause for surprise; for lions were then quite plentiful in southern California, and they had seen many. The lion gave them one glance only, then with hanging head slowly plodded straight on.

Before the mammoths left the high ground of the foothills they beheld on the plain below various other animals in motion. And even when upon the plain, their own lofty

stature enabled them to overlook things that to smaller animals were invisible. They saw a huge cave bear slowly plodding along with his mouth open, and at a safe distance behind him a pack of gray wolves, furtively gliding with lowered heads and drooping tails. In the middle distance, away to the eastward, a high-humped black animal with massive horns, also heading westward, looked like one of the giant bison of that time.

Of all the other animals observed, each one seemed entirely indifferent to the existence of his neighbors, but all were heading for the same point in the plain. What was the common impulse? And what the coming objective?

It was *thirst;* and *water!*

When the mammoths had gone a short distance into the plain a piercing cry was heard, and the wary Ganesa promptly halted to hearken. With their sides heaving, and their throats hot and dry, the two trailers were glad of another stop. The new pace of the Old He-One was worrying them. Few people of this careless world now either know or imagine the privations and suffering that wild animals undergo in their never-ending struggle for food, water and security. It is also to be feared that few care!

With all six of their great sail-like ears held stiffly out from their heads, the three mammoths listened. From the plain southward, under the circling birds, came occasional cries of terrible import, as of wild animals in distress. Though at first but faintly heard, it was a med-

ley of irregular and spasmodic howls, roars and screams of pain.

Never before had Ganesa and his consort heard aught like that!

Awed and wondering, but now driven forward by curiosity, increasing heat and their own physical distress, the elephants pressed on, ears thrown forward and eyes staring ahead. At the end of each new half-mile, the wary and experienced leader abruptly halted, listened, raised his trunk high in the air and with its tip bent forward at a blunt right angle suspiciously smelled the air.

Presently strange and fearsome odors smote Ganesa's dull nostrils. The most commanding one was of a sickening character that he rarely had smelled before, but which he recognized as decaying flesh. With it was mingled a drug-like and penetrating odor of a kind that was quite new to him. It thrilled him with a nameless fear, such as he never before had felt. What was that strange thing?

Cautiously now, and slowly, the elephants continued their advance. A band of wild horses turned and fled from them; but a pair of lumbering camels, marching at a close parallel to them, merely looked at them indifferently out of half-closed eyes, and with an air of great weariness marched straight on.

With their farther advance the cries ahead sounded more loud, more clear and more dreadful. Out of the awful medley of wails and roars, and shrieks of anguish and despair there arose not one joyous or contented

note. At the same time a wave of hot and fetid odor swept over the plain in a volume that was almost insupportable.

Presently Ganesa halted, ears, eyes and trunk strained forward, to analyze a terrifying sensation. For once the old giant actually trembled with fear, and apprehension of the unknown terror. What was it all about? For the first time that day he turned half around, irresolutely, and looked at his family. Mother and son stood fast, and met his gaze without flinching. Their action plainly said:

"Wherever you lead us, we will follow you."

The vote of confidence was sufficient. The Old One swung his huge bulk back upon the course and heaved forward. The game must be played to the end. There was now no difficulty in steering a straight course to the awful objective. A great cloud of birds wildly swooping and circling over it told a story of dead game in abundance.

Crashing a wide trail through an acre of leafless bushes and stunted trees, the elephants emerged in an open space, and paused in wonder and amazement. Their great stature gave them almost a bird's-eye view, and this was what they saw:

Close before them an open, pond-like space revealed a black plain half filled with a chaos of large animal forms and large birds. Of all the animals seen, great and small, only a very few were standing erect. All the others lay crouched, or prone upon their sides; and many were dead,

and half buried! *The great assemblage was mired in a pond of black asphalt!* Here and there on its surface glistened patches and pools of water—always the fatal lure of the thirsty animal. In the largest pool of open water two elephants were lying motionless and half submerged, while a third one stood erect, mired up to its chest, and feebly moved its trunk.

Frightened, and trembling from head to foot—for even the largest elephant trembles thus when badly frightened—the new ones cautiously marched forward, intent upon knowing the answer to the awful mystery of the Black Pool. Soon Ganesa's steps led him so near that the whole scene was sharply disclosed. With his mate and his son standing beside him in dumb terror and amazement, he surveyed the awful mystery, even though his mind yet failed fully to comprehend its meaning.

The place was a five-acre stage of death and horrors. The actors, living and dead, were scores of the wild beasts and birds of mountain and plain, both known and unknown.

The number of species entrapped in that black inferno was astounding. All California and the Sonoran Desert contributed recklessly of their best and bravest. The mountain sheep, white goat and valley elk alone were absent; and this seems to indicate that they were not represented in that region at that tragic time.

Never since the world began did the sun look down upon a more ghastly and terrible slaughter of wild animals by a natural cause. Mired there, and either dying or dead,

From a drawing by E. Rungius Fulda.

THE GREATEST WILD ANIMAL TRAGEDY.

The asphalt death trap at Rancho La Brea, Los Angeles, as it caught thousands of wild animals about 30,000 years ago.

were hairy mammoths and mastodons, great wide-horned bisons, giant cave bears, and villainous blood-sucking, sabre-toothed tigers. To Ganesa and his mate the dire wolves were old acquaintances; but they never before had seen the giant ground sloth, the llama, nor the camel. With the big red lions they had long been familiar.

Most prominent in view were the mammoths, a mastodon, two camels, and one of the giant wide-horned bison of that period. All these had been lured and entrapped by the water. The great supply of free flesh along with the water pools had attracted the cave bear, hundreds of sabre-toothed tigers, dozens of big lions, and coyotes and wolves without number. Many a large animal had around it, or upon its body, a group of wolves; and many of those savage and cruel flesh-eating beasts had become mired down and held to slow death without having once tasted blood.

The distant Past had contributed one rare and wonderful giant ground sloth, as large as a rhinoceros, which may have been the last of its race in North America. To the startled and dazed minds of the newly arrived elephants thought and logic came slowly. The situation was horribly bewildering. Why did so many, many animals lie, and continue to lie, in that black pool, and submit to the savage attacks of wolves and other animals? Why did not those that were living now drink and go away?

On the rounded side of a prostrate and half-buried elephant two black-soiled wolves stood high up, tearing at

its tough hide. A lion feebly moving lay close beside a motionless camel. A bear with black-smeared legs poised uncertainly on the side of a motionless horse, and around it lay several wolves and sabre-toothed tigers—all quite *dead!*

At last the Great Mystery penetrated the deep-seated brain of the mammoth. Those motionless animals were DEAD! The animals lying around them, feebly struggling and crying out, were *dying!* The black pool was the stage of a drama of death, set on a gigantic scale. Half a dozen mammoths and mastodons were involved in the chaos, and of lions, sabre tigers, wolves, bears, camels and bison, scores were in sight.

Around the edge of the pool other newly arrived animals were looking and longing, held by the fatal lure of free meat and water. A lion, more bold than the others, leaped forward, for a drink first and a feast afterward; but quickly his front feet stuck to the warm asphalt, and he halted abruptly. With a savage roar of annoyance and terror, he forcefully braced back and pulled up one front foot. A sticky black mass clung to it, stringing back to the mass from which it came. Instantly the grand animal became conscious of a new kind of peril, and began to fight to get free from the death-trap. But in vain! Each fresh struggle anchored his feet more firmly in the treacherous pool. In minutes, not hours, the exhausted and panting lion sank where he stood, to be clutched by the Tar Terror, and to rise nevermore. As his body became glued to the landscape, the wretched

lion pointed its muzzle at the brazen sky, and in the agony of despair sent forth roar after roar.

For many minutes little Esau, the baby mammoth, had been gazing fixedly upon the pool of real water that lay only a few yards beyond the safe spot where his sire had halted. The thirst torture in his throat was maddening, and at intervals his trunk sent out a protesting whine. While his parents were gazing intently upon the lion in distress, Esau made his resolve. Silently pushing forward he made straight for the water, and before his rash move was noted he had reached the soft margin of the pool.

As the baby's left front foot sank in the soft asphalt, his mother saw him, and instantly trumpeted a bugle-call of warning and command. But it was too late. Even while the blood-curdling note rang out far and wide, Esau's right foot went down beside his left.

Old Ganesa swiftly swung half around, and sent out a roar and a trumpet scream that surely must have been heard on Beverly Hills, so great was its volume, and so high its pitch.

Terribly frightened now, Esau braced back with his hind legs and attempted by a mighty effort to wrench his front feet free. And then the worst happened. The whole of his weight, thus suddenly thrown upon the small spot occupied by his hind feet, smashed through the thin crust of dry asphalt, and the Kid's hind feet shot down into the liquid mass below. Esau's fate was sealed.

And then followed what I believe was the mightiest

struggle that occurred in the long history of that famous death-trap.

Many naturalists and sportsmen know that wild elephants will range themselves on both sides of a wounded mate, and with their bodies, heads and trunks support him, and help him to keep his feet and escape. With their combined trunks large elephants will even pull a small elephant out of a pit-trap.

Animated by that protecting instinct, Ganesa and Constance rushed forward to save Esau, now struggling for life, and wildly trumpeting for help. Almost regardless of the danger, which at last they fully understood, Constance drove forward to a position on Esau's left flank, while Ganesa took the right. Few men unfamiliar with the wonderful intelligence of elephants can without seeing for themselves believe the stories of what they do.

Frantic with fear and excitement, the two big mammoths laid hold of Esau's legs with their enormous hairy trunks and pulled with all their strength, to drag him back to firm ground. In vain. His feet stuck as if bolted to the earth. Esau's trunk was seized by Ganesa, and strained to the utmost to hold the baby's head from going down into the tar; but this help was only temporary. At last his head reached the soft pitch.

Then the two great beasts lurched forward, close alongside their offspring, and while their own colossal feet sank into the soft mass, they caught Esau under the neck with their trunks, and lifted with all their power.

For a moment this effort was partially successful. The

smaller animal was bodily lifted three or four feet. For a moment the enormous strength of the big mammoths seemed about to defy the holding power of the asphalt pool, and win the escape of the whole family. But alas! It was not to be. Whenever the thickly-flowing asphalt closed over those great feet, and clutched three of them, it conquered. From that moment there was no such thing as escape. They realized their doom. The roars and trumpeting of those elephantine giants rang afar over the heat-stricken plain.

On the final death scene of those three magnificent animals, certainly among the last of the mammoths of North America, I will draw the veil of silence and darkness. In 1915 their remains were found and dug up for preservation, and along with them, in one spot only 17 by 30 feet, and 35 feet deep, were found the remains of *fourteen other elephants!*

The lions, sabre-toothed tigers, wolves, bears, camels, horses, ground sloths and other animals taken from the preserving asphalt-bed of Rancho La Brea, two miles southeast of Beverly Hills, represent a total of several *thousands* of individuals. In the museum of Los Angeles, and in that of the University of California at Berkeley, you will find examples of the best of them, mounted and displayed. In the former stands the complete skeleton of old Ganesa, 13 feet high; which is more than two feet above the height of Jumbo, and one foot taller than the largest living African elephant.

VI

THE GREAT TYRANT DINOSAUR OF HELL CREEK

JUST what the cavemen of long ago called that stream we do not know; but the plainsmen of Montana named it Hell Creek. And yet neither in spring nor fall, and still less in winter, does it look like the Bad Place. It is not dark nor gloomy, but flooded with blessed light. Instead of being hot and humid, its clear air has the invigorating lung quality of vaporized champagne.

Did the reader ever see any of the real bad lands of the great Western-Plains region, or the eastern foot-hills of the Rockies? I hope so. The worst of them are very weird and awful, but even the least of them are queer and interesting. The bad lands of Hell Creek and Snow Creek, Montana, immediately south of the Missouri River, opposite Glasgow, are the finest panorama of that kind of which I know in the West.

Therein, a great level table-land once loomed aloft six or seven hundred feet above the muddy Missouri flood. To-day it has been furrowed, hacked, gouged and carved by the hand of Time and the law of Change. Now it is a wild medley of ravines, blowouts, ridges, buttresses and buttes of hard-pan and sandstone. As you look at it from Panorama Point it is a bewildering maze of down-plunging, V-shaped ravines and water-courses in number

uncountable, garnished with a great assortment of cathedral walls, buttresses, towers and broken terraces galore.

High up on the edge of the grassy mesa, where it breaks down to the upper water-hole of Hell Creek, an old German-American wolf-killer named Max Sieber had with good taste and much labor builded for his lonesome self a picturesque Swiss-chalet log cabin. For a little one it was about the most beautiful log cabin I ever saw. Close by it was a log storehouse, and under that was a ranch-house for the dog.

Revolving around our camp with that cabin as the pivot of our hunting adventures, we found mule deer, antelope, bobcats, porcupines and jack rabbits. There was one band of bighorn sheep in those bad lands—a most dangerous and unfit place for sheep—but we were careful not to hunt it, either up or down. In a little patch of timber just below the rim of the mesa we found the fossil remains of a real buffalo-hunter's cabin, bearing the earmarks of 1880.

Mr. Laton A. Huffman, the Picture-Maker of Montana, and his companion were so fascinated by those bad-lands panoramas that they almost forgot to hunt for game! To save our faces, however, we did make shift to kill two mule deer, because I was really intent upon ascertaining precisely what those wild roustabouts were feeding upon in that blasted place. It proved to be solely a kind of pungent and aromatic weedy-looking sage-bush called narrow-leafed mugwort; but our mulish mule deer in the

Bronx scornfully refused to eat even our best sample of it!

The game we found was quite adequate for that barren place, but it did not even faintly suggest the great and wonderful beasts that had roamed over that mesa before finally it was finished, and afterward cut up by the elements to make the present bad lands of Hell Creek.

One fine morning while striding, graceful and free, across that level ten-acre bit of bare bad lands about two miles east of Sieber's cabin, we came upon the remains of a huge, weathered fossil skull, lying absolutely free upon the naked ground. The sudden shock of it almost bowled me over. All its revealing details were gone; but in the weathered mass it looked like a fairly large Indian elephant skull that had seen better days.

Later on old Max Sieber, our newly elected guide, gave me several large rib fragments, and at the finish—"Since you are so much interested"—he kindly added the stony front horn of a Tri-cer'a-tops! This grass-eating dinosaur (reptile) was as large as an African rhinoceros, and for self defense it had three excellent horns. Two of them were very long, and thrust forward in a most admirable position for attack or defense. In fact, no other horns known to me, living or dead, are so admirably designed for deadly frontal attack. The third horn stood, rhinoceros-fashion, on the end of the nose.

Two hundred yards up Hell Creek from the beautiful spot wherein we camped there rises from the eastern side

of the creek's bed a cone-shaped butte, of brown-gray, flinty-concretion rock, its western face weathered and bare. Its landward side is not steep, and from its top the bad-lands view is fine. There I slaved for nearly half an hour in collecting flat rocks, and building up a chimney-like monument four feet high, to be seen afar as a "water sign." Sieber's cabin and the water-hole were due west across the creek, and only 300 feet away. Now mark the sequel.

On returning to New York I lost not a moment in breaking to Professor Osborn, President of the American Museum of Natural History, the news that we had discovered a new fossil bed, and advising that an expert fossil-hunter be sent to our find, without delay.

That was enough. At the earliest practicable moment an experienced collector was sent to Hell Creek, and to Sieber's cabin. At the western foot of our water-sign butte he found bits of fossil remains that seemed to have been washed down the side of the butte from above. The trail was followed, straight up the steep, bare side of the little peak, and half way up a great find was made. It was the fossil skull, rear leg bones and pelvis of an astounding new flesh-eating dinosaur of gigantic size, representing not only a new species, but a new genus! Its skull (which was 4 feet long) and its huge jaws were outfitted with four rows of teeth big enough to tear lions and tigers as if they were rabbits.

Up to that time the majority of other American rep-

tiles of the dinosaur group, so far as discovered, were herbivorous, and therefore harmless to the other animals of their times. Mr. Huffman and I helped to put on the map a new fossil horizon, and a wonderful new genus.

The hind legs and pelvis of the colossal Hell Creek reptile, as they stand in the American Museum, are about 11 feet in height! Beside it there is also a complete mounted skeleton of this dinosaur, which stands high up on its hind legs, like a kangaroo. It stands 18½ feet high, it is 47 feet long and when alive that vast reptile must have weighed about 7,000 pounds.

And this original Terror of Hell Creek roamed through that region when there was *a lake-bed* with a bottom about 60 feet below the present top of the Water-Sign Butte!

Before these buttes were born, before the grand canyon of Hell Creek was hacked out of the mesa, and all the chips washed away, around the shore of the lake that had that high plain as its bottom, there roamed the Tyrant Dinosaur, now called *Ty-ran'no-sau-rus rex*, seeking whatever he might devour. That terrible outfit of stabbing and cutting teeth, rising 4 or 5 inches above the jaw-bone, left ordinary prey no room for argument.

Along with the Tyrant Dinosaur we know that the three-horned Triceratops lived, and probably the Duck-Billed Dinosaur, also a plant-eater. The latter seems to have had no real means of defense, but the Triceratops was better provided with defensive weapons. His two rear horns had good caliber and penetration, and they pointed forward absolutely right for puncturing the un-

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THE TYRANT DINOSAUR OF HELL CREEK, MONTANA.

Attacking a Triceratops family. Restored and drawn by Charles R. Knight.

protected abdomen of a hungry Tyrant Dinosaur. I will guarantee that on many occasions those horns rendered excellent service in promoting the survival of Triceratops against his savage and very dangerous enemy.

The original owner of the great weathered and unrecognizable skull that we found may have been attacked, bitten to death, torn to pieces and eaten, fifty pounds at a bite, by the same gigantic reptile now in the American Museum, who presently laid him down in his last sleep on the edge of the Hell Creek lake. It is quite easy and natural to imagine a bloody encounter between my three-horned Triceratops and the Big One, with horns matched against big teeth, ending in so many abdominal punctures for the dinosaur that the latter fell upon the lake shore and gave up his ghost.

The Tyrant Dinosaur lived far, far back in the Age of Reptiles, about 4,000,000 years ago, in Cre-ta'ce-ous times, and no doubt occasionally he fed upon the flesh of the grass-eating dinosaurs. So far as the rocks have revealed, it was the largest flesh-eating land animal that ever lived on this earth. And to think that at least one Three-Horned Dinosaur lived and died right at Max Sieber's cabin, only 600 feet away from our Sibley tent, where an unterrified great horned owl sang to us from his saint-like niche in the side of the sandstone cliff that half encircled our camp!

Yes indeed, there were "giants in those days." The fossil-hunters are hunting them out, and the rocks and gravels, the tar-pits, the peat bogs and the frozen tundras

of the far North all are giving up their testimony for the educating of puny Man. Marvellous and great have been the discoveries already made, and right truly have we learned that

> "The golden Sun,
> The planets, all the infinite hosts of heaven
> Are shining on the sad abodes of death,
> Through the still lapse of ages. *All that tread*
> *The globe are but a handful to the tribes*
> *That slumber in its bosom.*"

Does it not make one dizzy to look upon the remains of a giant reptile 4,000,000 years old?

With the lapse of time Man must grow in intelligence, or perish utterly from off the face of the earth. To-day, to stand still is to slip backward. Truth is mighty, and will prevail; and feeble and foolish is the human mind that in the light of this day dares to deny or ignore the unbreakable testimony of the rocks.

VII

STRANGE WILD ANIMALS IN PLATE ARMOR

THE protective coverings of wild animals challenge the interest of all boys and girls who think. Far more than one chapter might be written about them. The subject includes skin, scales, hair and fur of a hundred different kinds ranging all the way from the densest hair to a naked skin, and from naked skin to armor-plates of solid bone and horn. Out of this wide range of interesting items, my mind frequently dwells upon the animals with armor as those whose clothes are the most wonderful.

"In days of old, when knights were bold, and barons held their sway," the world saw much of the sometimes dangerous "Man on Horseback." He was canned up in a more or less complete suit of plate armor, often more dangerous to the wearer than to his enemy. There was chain armor, made of wire netting, which usually was referred to as the chain mail. In the presence of men with nasty long spears, or crossbowmen very crossly shooting unpleasant iron bolts every which way, plate armor had some advantages. It will be remembered, however, that it was so heavy and so cumbersome that each armored knight required the services of a lusty and faithful squire to help him on with his wash-boiler suit, help him mount his war horse, and finally after the open-shop day's work undress him and put him to bed.

Now, Mother Nature believes in armor for the protection of some of her children, but she has no use for squires or valets or varlets of any kind. Each pengolin, armadillo and glyptodon was fashioned as an independent citizen, and able to travel under his own steam. The first ones live in Asia and Africa, the armadillos are at home from southern Texas and Arizona to Patagonia, and the glyptodons all belong to the Past of Pan-America.

When I went as a young man to the wonderful Ward's Museum at Rochester, to gain a modest allowance of zoological knowledge and skill, I was made for a brief time the servant of Paleontology. In other words, I was sentenced to alleged labor, in scraping the mould-marks off very big, brutally thick and fearfully heavy plaster casts of the shell and tail of the great South American glyptodon, extinct for lo ! these many centuries.

And I revelled in it ! That perfectly unbelievable tail—a huge mass of fantastic tubercles—seemed not at all of this world. At first my western-prairie mind almost refused to believe it. It then seemed to me that no one could possibly believe in it without scraping at least one glyp cast, and I defy any reporter on earth to describe it so that it can be seen with the mind's eye.

Of course the shell of the great dead-and-gone glyptodon was the big thing. The specimen cast so often in plaster-of-paris by Ward's establishment was as big as a hogshead, and weighed a quarter of a ton. Very roughly speaking it was spherical, like three-quarters of a globe, with a large opening front and rear for the take-off of

the neck and tail. In the original fossil glyptodon skeleton, to be seen best and most abundantly in the Museum of Buenos Ayres, the big turtle-like shell is composed of flat plates of bone, eight-sided in shape, and very solidly joined together to form a tremendously high and solid dome. The bony dome of a big glyptodon, with a shell 3 inches thick and 4 feet high, looks as if nothing less than a 6-inch armor-piercing shell could penetrate it—and it does not greatly belie its looks.

Like the humble armadillos of to-day, the glyptodons of the Past lived on open plains, but whenever they could they took refuge in caves, and cavernous washouts in the hard-pan earth. In Argentina some glyptodon remains have been found in such fresh condition that they bring those remarkable mammals down to almost recent zoological times.

The species of glyptodons are so numerous that they form a Family of no mean proportions. The armadillos of to-day are their nearest living relatives, but the large glyptodons were supergiants in comparison with even the largest living giant armadillo specimens alive to-day in northern South America.

The glyptodons that we know best formerly lived in Texas and Argentina. Our illustration shows in its foreground three specimens of the giant Pampas Glyptodon, of Argentina, restored to the appearance of life, drawn from specimens in the wonderful group in the American Museum of Natural History at New York. Estimated outside the glass walls of the case, the total length of this

astounding animal seems to be about 7 feet, the full height of the dome-shaped shell is about 5 feet, and the head is about 16 inches long.* It was found near Buenos Aires, in 1877.

We are proud of the fact that the United States once contained a glyptodon species of a very satisfactory size. The Texas Glyptodon, found in 1901 in Crosby County, Texas, by an American Museum expedition, is shown in the background of the illustration. Following the curves, its shell measures 4 feet 9 inches over its back from head to tail, and 6 feet 4 inches from side to side.

And think of the joy it would be to any intelligent person to meet to-day one of these wonderland animals stalking over the Texas Panhandle, or any other portion of the Lone Star State, bearing up under the Latin name of *Glyp-to-the'ri-um tex-an'um.*

The most wonderful armadillo species now living on this earth is not the rare, "giant" species of northern South America, but the small three-banded armadillo of Argentina. It looks somewhat like a fairy glyptodon with three very workable joints along the equatorial belt of its shell. The wonderful features of this little beast are: (1) the thickness and strength of its shell, (2) the completeness of its armor and (3) the bomb-proof character of its defenses.

When this living box is attacked by a maned wolf, a wild dog, puma or jaguar it instantly folds its legs and feet close up against its body, and pulls the strings

*The Latin name of this species is *Panochtus fronzelianus.*

From a drawing by E. Rungius Fulda.

THE GREAT PAMPAS GLYPTODON OF ARGENTINA AND HIS RELATIVES.

The Pampas Glyptodon (in the foreground), the Texas Glyptodon (background), and the small living Three-Banded Armadillo (inset in corner).

that close the shell into a round ball of bone. The fully armored tail takes care of itself. The head is tightly drawn in between the fore legs, so that no portion of it is exposed save the top of the head and face—and Nature has thoughtfully covered all that surface with an independent plate of armor that affords very good protection.

And there on the landscape lies a ball of bone; and the more it is attacked the more tightly it contracts, and the harder it is to crack. The length of the body and head of this really astounding animal is about 15 inches.

Of course we believe that the wild animals now upon the earth represent "the survival of the fittest"; which is a short way of describing those that are best fitted to take care of themselves. We say that the animals which finally lost the ability to procure food have starved to death, and the animals that were too slow on foot to escape from their enemies were caught and eaten. We can quite understand how animals with the best horns for defense lived longest, and gradually grew longer and stronger horns; but for the life of me I cannot figure out how the armadillo got a hard, *bony* shell for defense when it was due to have hair.

I am proud of the fact that the wild-animal list of the United States contains *one* armadillo species. It is the small and rather weak nine-banded armadillo, and it is found from southern Texas to Argentina. The shell is not very thick nor very strong, but on a clear prairie they are almost as nimble and quick on foot as rabbits.

The way to get one is to dig it out of its burrow. The nine-banded is short-lived in captivity, but the six-banded of Brazil and Argentina is more enduring. At home they feed on insects, grubs and earthworms; but in New York they eat finely chopped lean beef stirred up in milk with raw eggs.

But there is yet another line of animals in armor, that many persons regard as more wonderful than the armadillos. They are the pengolins, or manises, of the East Indies and Africa. In the lovely Island of Ceylon I once had one as a pet, until it outwitted me in one of its attempts to escape, and for a brief time actually did escape! With its strong front claws (made for hard digging) it tore a hole in a tin packing-case wherein I undertook to keep it overnight, and the troublesome low-caste dogs of the village overhauled my prize literally at the gateway to the jungle. The row they made saved me from losing my very oddest pet.

The manis has a pointed head, a long, slender body, short legs and a very long tail of remarkable shape. The whole upper surface of the head, neck, body and tail, and the outsides of the hind legs, are covered with the most beautiful and perfect scale armor ever fashioned by man or Nature. The big triangular scales are of gray horn, they are convex above, concave below and are cunningly curved to make them fit the roundness of the body. They are arranged in rows with strict regularity, they alternate perfectly and overlap as evenly as the slates of a good roof. Each scale is fastened to the skin at its base

only, leaving the plate free to move and adjust itself to all the varying poses of the body.

As the manis walks, this horny armor clanks. Often the manis stands erect on its hind legs, like a kangaroo, to look at the surrounding scenery. Now the manis, like the armadillos, has no teeth for defense. Its middle front claws are long and sharp, but the animal has no striking power, and so it is unable to fight its way through the very dangerous jungle world in which it lives. This is Nature's reason for the scale armor; and mark you how it works.

When a leopard, a wild dog or a jackal undertakes to "collect" a manis, the scaly one quickly tucks his head down between his fore legs, brings his tail under his body, and up over his head. In doing this he rolls himself into a tight and compact ball, slightly flattened at the poles. Finally, he closes up the two sides with the scaly outside portions of his hind legs, and defies the world.

At the end of the first quarter-hour of our acquaintance I undertook to unroll my manis; but he refused to unroll for me. I called a servant to help me; but that tail stuck to its body as if it had been riveted there.

Then I called a third man to help, and while I held fast to the body of the funny little beast the other two wrestled with that manis until we were all exhausted, and had to give up—beaten! The coiling power of that small animal was beyond computation.

This exhibition led an old Singhalese native to inform me very gravely that when an elephant troubles a manis,

and the latter wishes to get square, the manis coils around the trunk of the elephant, shuts off all the nasal passages and smothers the great beast to death. But that was only a tale that he told me.

The manis of India and the pengolin of Africa are all ant-eaters. With their long and strong front claws they dig into ant-hills, and pull to pieces decayed logs and stumps in search of ants. The tongue is very long and worm-like, and when it is thrust into an ant's runway or fortress, the insects stick to its moist surface and go to their doom.

The pengolin of Africa is marked by a wonderfully long and slender tail, far out of proportion with the body. Altogether, that tail is a fine piece of work, and only a most skilled human craftsman could make one like it.

VIII

THE LAND OF A HUNDRED VOLCANOES

IN all the world there are, after all, only a few places in which the working methods of nature lie fully revealed over a great area. The geologist searches far and wide to find a sufficient number of exposed rock cliffs in order that he may piece together the "theory" on which he is working. The physical geographer finds what has been made, and sets down what he sees upon the surface. In the temperate and tropic zones dense mantles of soil, trees and other vegetation that have been ages in the making cover and often conceal the actual step-by-step processes of Nature.

But there are some glorious exceptions.

For instance, I know a place wherein there is spread out, before all eyes that can see, an array of vast and awesome exhibits showing how Nature does things. They show you:

First, how Nature gets rid of acute indigestion, by throwing up indigestible lava and ashes;

Second, how she goes to work to dissolve and crumble that cold lava, and make it useful land; and,

Third, how she plants these lava-fields with strange things that can grow there despite fierce heat and thirst.

My great display is labelled Pin-a-cat'e, and you will find it in the extreme northwestern corner of the State of

Sonora, Mexico. It lies up against the head of the Gulf of California, on the east, and it begins on the Mexico-United States boundary. Monument No. 180, of the international boundary, is the real starting-point of the show. It is my belief that the region described must be the most complete and instructive volcano wonderland in the whole Western Hemisphere. I helped to explore that region thoroughly, and to make it really known to the reading world for the first time. Yes; it had been known to the Papago Indians of southern Arizona, and a very, very few Mexicans, but somehow they had carelessly forgotten to mention it, and really, up to our exploration in 1907, it was as little known to the reading public as the interior of New Guinea.

The backbone of it, and the centre of it, is a range of scowling black-brown lava mountains, the highest peak of which rises 4,060 feet above the level of the close-by Gulf of California. The name of the range, which is Papago Indian, is pronounced Pin-a-cat'ty, and it was taken from a long-legged, jet-black beetle which, whenever disturbed, rears itself aloft, and stands upon its head and front legs.

About 1,000 years ago that region, which is about as large as the State of Rhode Island, was a vast collection of volcanoes! Some of the craters even now go down into the earth deep enough to bury the top of the Washington Monument 200 feet out of sight. One is big enough to hold a fleet of two dozen Atlantic line steamships, with room to spare.

The geographer of our party, Mr. Godfrey Sykes, mapped and measured those craters; and he estimated that hundreds of volcanoes once were active there. From the character of the thin and scanty vegetation that now is struggling to replant that awful area of lava and ashes we estimated that those volcanoes were active about 1,000 years ago.

Now, really, with Mr. Sykes's fine map before us, and with the fine photographs made by Doctor D. T. MacDougal and Mr. John M. Phillips, it required only a very moderate effort of the mind's eye to see that Pinacate region as it was in its active days. Then come with me, you who will, and let me lead you from the United States-Mexican boundary, 21 miles south by west from Monument No. 180.

Now, in imagination let us go back into the Past, about 950 years!

. . . . . .

We must pick our way between the streams of lava that flow down upon the plain from many active volcanoes. Some of them are hot, others lukewarm, and a few are stiff and cold. The surfaces of all are rough and wavy, like molten iron, and they savagely glower at the heavens, defying all the elements of Nature to change them if they can.

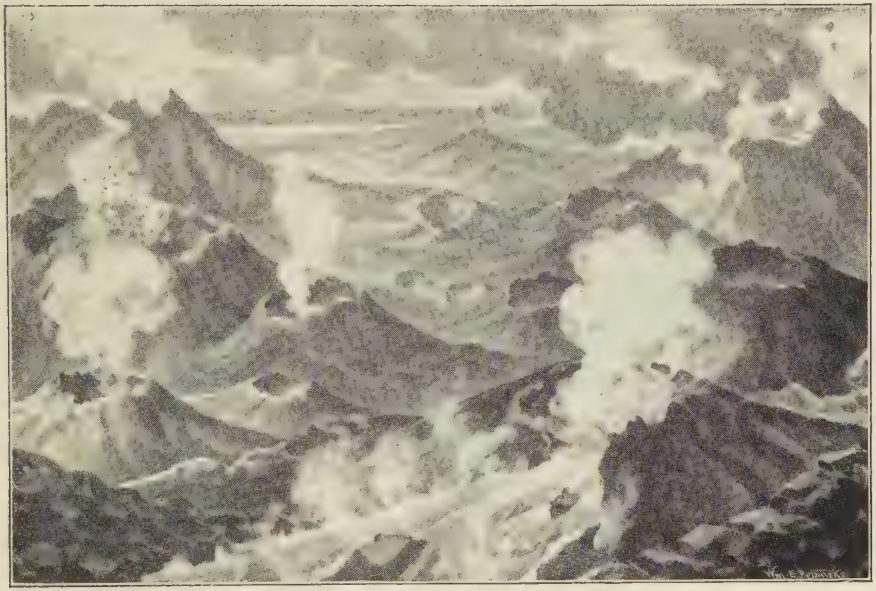
We reach the northern spur of Pinacate Peak. Finding that the lava is cool enough for our feet to endure it, we painfully hobble forward over the awful ruggedness.

With wrenched ankles and tired feet we stand at last on the dangerous summit, and look about at the picture that we have toiled so hard to see.

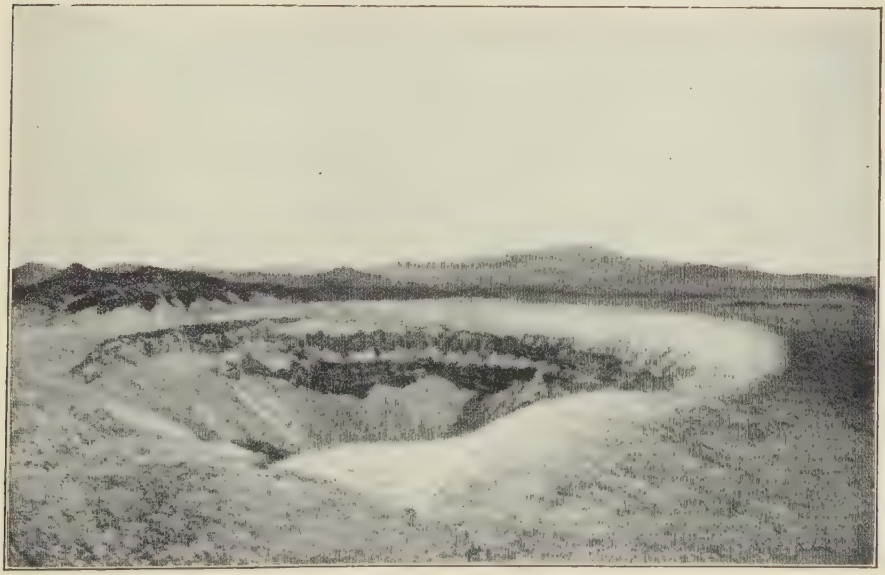
Nature is stoking her hidden fires, casting out hot cinders, lava, stones, ashes and other waste materials, and spoiling the surface of Sonora.

Eagerly our eyes, smarting keenly from heat, smoke and perspiration, sweep the horizon, round the whole 360 degrees of its circle. The north, the east, the south and also a short distance west is one great circular maze of smoking volcanoes. A perfect view of this volcano panorama would be from the air about four miles toward the southeast. Eleven miles away north-northwest, a huge circular cavity with a lofty rim three *miles* in circumference is belching forth a great volume of rolling smoke clouds with occasional flashes of flame. High aloft in the still, hot air the smoke mushrooms for miles. Toward the south a great wide sheet of molten lava is flowing from it, glowing red where it leaves the crater and paling as it goes. Its southern end, two miles away, is black and shining. (That volcano went nameless until 1907, when we measured it, mapped it and named it Sykes Volcano, in honor of our geographer. It is 750 feet deep.)

Sixteen smoking volcanoes are in sight. The whole of the world around Pinacate seems to be filled with their deadly activity. All vegetation is dead. What a terrible world of fire, molten rocks and ashes is that which lies beneath our feet! In addition to the belching cones around us, there are dozens of old and dead volcano peaks,



A view from the air, hundreds of years ago, looking across Pinacate Peak northwestward toward the head of the Gulf of California, and the peninsula of Lower California beyond.



Sykes Crater, as it is to-day, 3 miles in circumference and 750 feet deep!

THE HUNDRED VOLCANOES OF PINACATE, NORTHWESTERN MEXICO.

and deep-hole craters which have done their work on a more humble plan and subsided.

Twelve miles away due northeast there is a big but low-lying volcano crater industriously sending up a white bouquet of smoke surrounded low down by a circular gray shower. The Red Volcano is fanning out ashes, and all around it lies a great ring of white. (That ring of gray ashes you will find there to-day.)

Half-way between us and the great Red Volcano, but a little to the left, is another active volcano surrounded by a circle of dull, red fire, which we know is molten lava being pumped up from the white-hot bowels of the earth and made to flow slowly over the landscape like molten iron, there to cool, harden and lie naked and glowering for a thousand years.

Close to the peak on which we stand in wonder-stricken amazement and awe, and only a few hundred yards away, a new fissure has burst open from below, and heavy, sodden ashes are rather gently being thrown out in a circular shower. This is a strictly local affair, meddling with no distant thing, and quietly working away as if determined to make a fine, new, red-lava-ash peak "or bust." This is the beginning of what 1,000 years later became Carnegie Peak. It is a perfect cone, as round and shapely as an inverted funnel, sharp-pointed and built wholly *of red ashes.* To-day its summit is only 200 feet lower than the rim of the great Pinacate Volcano, which is 4,060 feet high.

But the greatest spectacle of all lies almost under our

feet, westward. Once this summit on which we stand had formed the southern rim of a huge three-peaked volcano, 4,000 feet high. Its diameter was then about a mile. From the vast blast-furnace in the bowels of the earth, even at the beginning of this display of working volcanoes, Nature forced up billions of tons of molten basaltic lava, until that huge hollow cone was filled almost to the top. The rock rim, an eighth of a mile thick, could not permanently endure the strain. At two places, west and south, the mountain rim gave way, two wide gaps were broken and two vast floods of molten red-hot lava flowed out, and down, and spread for miles over the sloping plains below. From the west you must climb and struggle for five awful miles over the terrible surface of that lava-flow in order to pass through the west notch into the remains of the great Pinacate crater, then climb 2,000 feet more to reach the highest point of the highest peak.

The westward bird's-eye view is both awful and pleasing. Scattered over the northwestern quarter of this great volcano collection there are many active volcanoes, both great and small, smoking gently or smoking briskly, with rough black plains stretching between. Two of the volcanoes are undoubtedly very large, for one is throwing out a vast cloud mushroom of black and the other a cloud of gray. One must be cold lava *cinders*, the other fine, hot ashes. (A thousand years later one was named McDougal Crater and the other Molina; and by their abandoned works ye shall know them.)

A few miles away the edge of this dark and cloudy volcano land breaks off very abruptly at the edge of a zone of billowy sand eight miles wide. Beyond that gleam the silvery waters of the long and narrow Gulf of California.

Beyond that farther shore rises high the dark and rugged central mountains of what, 1,000 years later, became known as Lower California. The western sun, descending through a haze and maze of volcano smoke casts a weird glamour upon a truly awful scene, the outlets of Nature's hidden fiery furnaces.

And now let us return to the present day, and see how Nature replants a lava-field.

. . . . . .

The heat of the lava, ashes and salt water that overwhelmed every square foot of the Pinacate Lavaland quickly blotted out every living thing. The animals, the birds and the reptiles that could not flee away were burned to death. Every vestige of the scanty vegetation of that region was totally consumed. Even 500 years ago we would have found there a land wholly destitute of life-giving soil—rugged, stony and accursed, and without more than a sign of vegetation. Its annual rainfall of two inches was a ghastly joke. Blasted, blistering and forbidding those plains and peaks, those lava-basalt arroyos, all seemed to glare at the heavens, cursing and accursed. It was as dead as the moon; and then it looked like the shrivelled landscapes of that hopeless planet.

But wonderful are the ways of patient and long-suf-

fering Nature. In her mighty bosom two warring forces perpetually contend. The Hindus of India have deified one as Siva, the god of Destruction. He is the maker of volcanoes, lava, devastation and death. The other is Vishnu, the Preserver—the restorer, the upbuilder and the planter.

In course of time Vishnu summoned his forces and valiantly set to work to resoil, replant and restore the lost vegetation that had been torn from him in Lavaland by Siva's volcanoes. But how was such a seemingly impossible and hopeless task to be accomplished? Was any man ever called upon to plant a field so dead as a lava-field without water?

Wise beyond all telling, and far beyond the poor wisdom of man, is the wisdom of Nature. When her Committee on Ways and Means sets to work results may with confidence be expected.

Naturally, before there can be any planting, there must be soil, or something that passes as such.

On the eastern shore of the Gulf of California sand always has been plentiful and cheap. Mother Nature told her West Wind to pick it up, carry on its wings the finest and best of it and spread it all over the dead fields and peaks of Lavaland. In siroccos, the desert sands travel fearsomely on the wings of the wind. In the Pinacate wonderland you can see (by lying down) that the West Wind carries fine sand close to the surface of the earth, where it rolls and drifts forward in a continuous advance. Even when you think there is practically no wind the

sand keeps gently moving on; and when the wind is strong the amount carried is considerable.

The spread of sand over the lava-fields, the feeble annual rain upon it and gradual weathering and breaking up of the surface of the softest lava slowly—ever so slowly—gave a little soil for the growth of desert plants and shrubs. The beds of ashes and fine lava encouraged vegetation, and they received the wind-blown seeds of the air-running species that could best endure heat and thirst.

The first large thing to take root and multiply was Bigelow's accursed choya. To-day you will find that it leads the van of the plants that are fighting with heat and thirst to reforest that region. It is terribly well protected by its spines. Its multitude of fruit joints and its many seeds cause the wild creatures to distribute its seeds literally everywhere. You will find it in the best soil, and also in the worst, on the steep cones of red ashes and on the most rugged lava peaks. It is the skunk of the plant world, and it refuses to give up.

Of course the most suitable plants to use in replanting those blasted landscapes are the hardy and indestructible species that through 10,000 years of heat and thirst had been "tried as by fire" on the hot mountains of Lower California and the great Desert of Sonora. Not one of the grasses, plants or trees of the eastern United States could survive there. Such a land must have its own special outfit of plants and trees, according to the evil conditions that make for death and destruction.

Go to the Pinacate country to-day, and you will be interested and thrilled by the gallant and successful struggle that Vishnu is making there to replant that seemingly hopeless region. In the level sands near the edge of the lava-field and in the sandy arroyos you will find well-nigh the only grass. It is the galleta grass (called guy-ya'ta). It is tall, rank, coarse and fearfully tough, but the hungry horses and the jack rabbits think that it is far better than no grass.

Along the arroyos (rocky ravines) where water sometimes runs, you will find a very, very few mesquite, palo verde and ironwood trees of all degrees of stuntedness, but in spots where rain-water accumulates in rocky and sandy basins there are real trees, sometimes as much as 15 feet high. In a certain night bivouac on the open side of Pinacate without blankets, in November, we found and thankfully burned for our warming an old ironwood tree that writhed and twisted over the ground like a regal python in the throes of death.

The way bushes and cacti grow on that naked lava, through grilling summer heat and without the least trace of visible soil, is cause for perpetual wonder. The giant tree cactus, or sawarro, defiantly grows wherever it pleases, soil or no soil; but on the lava its growth is dwarfed from a gigantic many-armed candelabrum 50 feet high to a single small stem 8 or 10 feet high. The little tree choyas are almost absent, and so is the great organ-pipe cactus, and also the blessed bisnaga or barrel cactus from which cactus candy is made farther north in

the United States. Gone also are the broad-leaved prickly pears and night-blooming cereus.

The creosote bush is willing to grow and do its best wherever there is plenty of sand, but it firmly begs to be excused from trying to grow on bare lava in a temperature of 130° in the shade.

Nature has introduced there a low, bushy bush that is highly ornamental and pleasing to the discerning eye. It is the white brittle bush, so named because its leaves give it a conspicuous white appearance, and its branches are so brittle that they can be snapped off a dozen at a time, like breaking a bush made of dry macaroni. It is quite indifferent to soil, and it cheerfully defies the heat of the lava-fields to do its worst.

Strange to say, even the scanty mantle of vegetation that Nature is slowly and patiently spreading over that awful land has attracted a scanty but bold wild-animal population consisting (in 1907) of about 75 mountain sheep, 30 antelope, 30 rascally coyotes, 125 pack-rats, 10,000 little elf-like kangaroo rats and 75 jack rabbits. I did not see and count all of them. I am estimating according to what we did see and count.

I regret to add that ever since 1907 hunters have been working hard each year at the task of exterminating those mountain sheep, and now probably not more than one band of 20 or 30 head remain on the Sierra Pinacate. We have the satisfaction of knowing, however, that that wonderland contains two things that destructive man cannot destroy. These are the lava and the sand.

And now we are joyously able to record the fact that on October 1, 1922, President Obregon issued an executive decree forbidding *for ten years* the killing of any mountain sheep or prong-horned antelope anywhere in the Republic of Mexico. That law now is being enforced. I have good reason to know that ever since October 1, 1923, Mr. Ben Tinker, Honorary Game Guardian, has been watching every sheep-range and antelope plain in the whole Pinacate region, and enforcing the full terms of the presidential proclamation.

II

TALES OF TO-DAY

IX

THE LAND OF EVERYTHING STRANGE

"We will put on a reel from Sonora,
And go to a wild wonderland,
Where South Arizona will show you
A desert without any sand.

The valleys are level and cheerful;
The mountains are sudden and steep.
The cacti will fill you with wonder,
And also with spines, till you weep."

—*The Sonoran Desert.*

THE ways in which Nature has designed and executed strange plants and trees to live on the Sonoran Desert, and to feed the wild creatures there, are enough to inspire wonderment and awe in the dullest mind.

Sometimes the word "desert" is loosely used, and does not always mean what we expect. Thinking back to the Great Sahara, the first desert of our childhood dreams, we think of great rolling wastes of naked sand and rocky ridges, destitute of bushes and trees, and over all the twin terrors of heat and thirst.

But we find that there are deserts and deserts; and some that we know are far more interesting to you and to me than many prosy lands of green groves and fertile fields. This America of ours is a land of many exceptions and surprises. Now, in the Southwest it contains a wide

region in which the whole outfit of soils, trees, shrubs and plants are totally different from all those we have seen and known elsewhere. In fact, it is as queer and as different as if all that vegetation had come in straight from another world!

That region is the great Sonoran Desert, the Land of Strange Things; and it covers southern Arizona and northwestern Mexico. Its tree and plant life differs widely from that of the high table-land of northern Arizona, and even from the vegetation of the Colorado and Mohave Deserts, and to me it is far more interesting than either of the neighboring deserts. For example, you do not find the giant tree cactus north of the Sonoran Desert.

I have seen the Sonoran in the best of all ways to see a desert. It was partly from the back of a good horse and partly from the hurricane deck of a prairie schooner, with no bothersome canvas cover, making five knots an hour. It was over smooth, hard roads, and there was time enough to analyze the desert, mile by mile. Every automobile travels too rapidly, and a railway train gives nothing but glimpses.

A typical landscape view on the Sonoran Desert is like a vast scene in a theatre. You see a level plain on which short ranges of theatrical mountains have been set up without any foot-hills, and rise abruptly and steeply from the stage floor. The wide and level valleys that you see between these long lines or groups of mountains are the so-called "desert," and some of them are 30 miles wide. Naturally the tenderfoot visitor expects to see gray and

Photographed by Doctor Daniel T. MacDougal.

A LANDSCAPE IN THE LAND OF EVERYTHING STRANGE.

A botanical garden in the Sonoran Desert.

melancholy wastes of barren sand; but instead of that he sees, save in a few far-off places—no sand, and no ugly stretches of bare ground! The "desert" plains are so thoroughly garnished with green bushes and trees of queer sorts that the stranger wonders when the "desert" will begin! There is a rich and wonderful profusion of different kinds and sizes of cacti, ranging from the humble prickly pear, the "nigger-head," choya, bisnaga and organ-pipe to the giant sawarro tree cactus 60 feet high —the greatest plant wonder of all deserts. Nowhere else in America can be found such a weird and astounding botanical garden as this.

In writing a certain tale of adventure and explorations in this wonderland, I adopted for it the name "arboreal desert," or desert of trees and bushes, and the name has taken root in our none-too-graphic American language.

Throughout the level plains of the Sonoran Desert the most conspicuous single feature of tree or bush life is the creosote bush. It covers and adorns those vast hot plains of sun-baked soil, even whence all but it have fled. It averages about 3 feet in height, its many-stemmed clumps stand about 7 feet apart, because there is not enough rainfall to supply any more of them! As you stand and look far across the level top of ten or twenty miles of it, the plain looks like a young orchard. The ground spaces between the clumps are bare, and they afford glorious runways for the Gambel quail, jack rabbits, pack-rats and kangaroo rats that live in the creosote's friendly shelter.

The bruised leaves of the creosote bush taste like creosote, and no domestic animal is able to eat them. I think that they *must* be eaten by *some* wild animal, but I cannot prove it. We crossed one sandy plain seven miles miles wide which contained nothing alive but creosote bushes and about 10,000 tiny, elf-like kangaroo rats (Dipodomys), and if these little beasts do not eat the leaves or bark or roots of those bushes, then *on what do they live?*

Next to the stage-property mountains of southern Arizona the most picturesque desert feature is the giant cactus. To me this is one of the greatest plant wonders of the world. In my own mind I rank it next in picturesque interest to the giant sequoia trees of California. Out of the queer Arizona landscape it looms up weird, peculiar and commanding. If you respect age, take off your hat in the presence of the tall ones, for they date back into the past century. You behold a massive straight trunk rising high in the air, set here and there with a very few enormous trunk-like branches that often take on fantastic twists and angles. The finest giant cactus takes the form of a colossal candelabrum; but the younger ones are merely thick and club-like stems with no branches.

The outer surface of this astounding tree-plant runs up and down in powerful accordion plaits, with millions of small stickers set along their ridges. The scalloped spaces between are smooth as satin, and of the same beautiful olive-green color as the flat leaves of the common prickly pear. Internally there is a stout *wooden rod* for

each accordion plait, and standing as they do in a circle they amply support the tree. No, they never blow over. Doctor MacDougal and his men sent out to me from the Desert Botanical Laboratory a 5-foot section of the circular wooden-rod skeleton of a giant cactus, and truly it is a real "curio."

In its own country the giant cactus always is called the sawarro, but they spell it in Spanish style—"sahuaro" —which completely disguises its pronunciation from English-speaking people.

Less frequently seen than the giant cactus is the well-named organ-pipe cactus, which unfailingly you will recognize by its name whenever you see it. It grows in clumps, wherein a dozen tall, straight stems rise from the ground from a single root. In Arizona they rarely grow 10 feet high, but in the edge of Mexico I saw one that was 20 feet high, and contained 20 stems, each one about 6 or 7 inches thick. Altogether, this species makes a fine exhibit of the cactus resources of the Sonoran Desert region.

But all this while the terrible tree choyas have been clamoring for notice, and he who ignores them too long is likely to pay dearly for it. In number of species they are by far the most numerous, and some of them do slightly resemble nightmare "trees." As trees they are of small stature, but what they lack in height they make up in numerous, angular and fantastic branches. The tree choyas range in height from 2 feet to 8, and the varieties are many. One and all they are heavily clad

with long spines that hurt awfully when they go into human flesh, and still worse when they come out. They have no leaves—just round or square stems. Some of them bear edible fruit in the form of nasty, prickly joints, and the mountain sheep feed upon that horrid and painful fruit, because they have nothing better.

In the frightfully tangled and thorny tops of those deadly tree choyas the cactus wrens, the crissal thrashers and other birds build their nests in order that those thousands of needle-sharp spines will help to defend them from the hawks, the owls, the foxes and the coyotes.

Those tree choyas are so numerous that sometimes a 5-acre field will be so well covered by them that it looks like a desert botanical garden. Stand with the early morning sun at your back, and you will find that the level rays falling upon those millions of long, white, glistening, bristling spines make them look like shining glass.

The tree choyas have wood skeletons, and the one here before me is a hollow, branching trunk, full of regularly placed holes that make it resemble fretwork carved out of white wood.

On leaving the tree-like cactus forms we come down to the big, black, solid species that are no less wonderful than some of their taller rivals. They run in many sizes from the lowly, round "nigger-head" cactus to the big and burly barrel cactus that is full of interest and cactus-candy material. Study them, for they are fearfully and wonderfully made. These forms are rounded, solid and

branched masses—but you should see their outfits of spines! In systematic spine development I know of nothing in the world equal to the nigger-heads. Both in design and execution they are as regular as the scales of a fish, but the way they vary in length, and curve at the tip, and pack together in a hopeless spine entanglement is quite sufficient to discourage any animal, wild or tame.

The largest of all is the bis-na'ga, or barrel cactus of blessed memory. The man lost on a desert, and due to die of thirst, *can save himself* if he can find one of these living water tanks! With a strong knife he must cut off its top, and with a club pound its cool and watery interior into a pulpy mass, then squeeze out the water and drink it. The flavor of it is not only fine, but when the fresh pulp is cut up skilfully and treated with intelligence and white sugar it makes most delicious candy! You will find the best of it in Tucson, price 50 cents per pound; but buy only the white kind. Any brown sugar treatment always murders the delicate and agreeable cactus flavor.

Of the prickly-pear species, with big, broad leaves, there are many. In the Ajo Valley there are great fields of them, and they certainly look good enough to eat. There are some spineless species of prickly pears, all of which serve well as food for cattle, and deserve to be "introduced" all over Arizona. Why delay this duty any longer?

In the flood plains, and along the watercourses that sometimes really flow with genuine water, certain trees are found that for 9 months of the year are fire-proof and thirst-proof.

The palo verde is a tree to know and to cherish. In Spanish "pal'o" means tree, and "ver'de" means green. The bark is as smooth as ivory, and of a beautiful, soft asparagus-green color. The leaves—well, when you first behold this tree you will say, "Why, it *has* no leaves!"

And truly, it looks that way. The top of the little, low tree seems to consist wholly of rather angular branches and countless little straight twigs the size of broom-straws. But there are leaves. Look very closely, and you will find them ranged along those straw-like twigs, far apart and so small that it would take about twelve of them to cover a postage-stamp. This very odd tree is about 15 feet high, shaped very much like an apple tree, and it is the most beautiful and most interesting tree that I ever saw in a desert region. I never grew tired of it, even when in need of noonday shade.

The mesquite (pronounced mes-keet) is the companion of the palo verde. It is similar in size and shape, and in meagreness of foliage, but its wood is hard and useful, and the best for camp-fires that the Sonoran Desert affords. It is almost indestructible by thirst and dryness, and that is why we find it associated along the dried-up watercourses with the ironwood and palo verde.

There is one other feature of the Sonoran Desert that really must be mentioned, in order that when you see that wonderland with your own eyes you will not chide some one for not having told you about it.

It is the amazing ocatilla!

By the time you have come to the places where this

soil-and-water-defying *tree* grows abundantly and large you will have seen so many other strange things that the edge of your wonderment has actually become a little dulled. But, however that may be, I must tell you that the ocatilla is one of the greatest curiosities in plant life in the class of trees.

In the first place, its trunk grows almost wholly in the ground, like a big beet. Its stem reaches just above the ground, as a flat-topped stub; and from that flat top there spring upward, and droop far apart and outward, a big bunch of a dozen or twenty long, slender, fairy wands each from 10 to *18 feet* long, tapering to slender tips that gracefully wave in the air. In midsummer the upper portions of these fairy wands are studded with beautiful scarlet flowers. In November the flowers are gone, and the fairy wands then are thickly set from base to tip with lovely green leaves—and the picturesque effect is beautiful to see.

But wait for the end of the ocatilla's story.

Later on, when the heat and dryness shrivel up the *blades* of those green leaves, they vanish, and the midrib of each leaf develops into a formidable *thorn!* From base to tip each stem is armed with an array of big, brutal thorns so formidable that no browsing animal dares to do more than just look at it from a safe distance and hurry on.

Most of the desert trees and plants are armed with spines and thorns. Some of the bushes that are not so armed are protected by stems of such bitter taste that

nothing can eat them. Very many of the plants of the desert, like *all* the cacti, the white brittle bush and the Ajo lily, *store up in their thick bodies*, or in huge bulbous roots below the surface of the earth, the supplies of water that alone can carry them through the annual periods of no rain and great heat.

When the signs of your zodiac are right, do take a camping-trip by automobile from Tucson to Ajo, Sonoyta, the Devil's Road, MacDougal Pass, Sykes Crater, the Papago Tanks and the great Pinacate lava-field. Go with the seeing eye and the open mind, get your feet on the lava of Pinacate, look down into three or four craters and you will come back a wiser and bigger man—or woman, as the case may be.

X

THE FAIRY GARDENS OF NEPTUNE

"The floor is of sand, like the mountain-drift,
And the pearl-shells spangle the flinty snow;
From coral rocks the sea-plants lift
Their boughs where the tides and billows flow.
The water is calm and still below,
For the winds and the waves are absent there,
And the sands are bright as the stars that glow,
In the motionless fields of upper air."—*Percival.*

THE visitor to the Bermudas, 700 miles out all alone in the Atlantic Ocean, soon realizes the extent and thoroughness of the dangerous barrier reefs that surround that fascinating tropical archipelago. The dangers of the approach from the sea can hardly be overestimated. It is no wonder that the bones of hundreds of ships lie bleaching and corroding on the coral entanglements that jealously guard The Narrows, the anchorage at Grassy Bay, and St. George's Bay. Every steamer has its own troubles in threading its way around the chancy Sea Venture Flats, and there is naught for the largest vessels to do but to lie out in what looks like an open roadstead.

It is not strange that, excepting the wonderful stalactite caves the greatest spectacles of the Bermudas are submarine, and have to do with coral reefs.

Through the kindness of Fortune I have been permitted to sail the Seven Seas, and behold some of their

wonders. When I was a real "boy traveller," roaming over the world and collecting museum specimens by the ton, I delighted in robbing the seas of their treasures and passing them up to the empty shelves of the new museums of America.

In the Christmas holidays only a short time ago we voyaged to the Bermudas, and by good luck we located at St. George, the jumping-off place at the northeastern point of the islands.

On a calm, bright morning we took ship at the quaint and interesting St. George terminal dock, passed out through St. George's Channel, swung around one-half of St. David's Island and its lighthouse and anchored off the old ruined castle that stands beside the quarantine station. The sea gardens we went to see are in the edge of the open sea, opposite the southeastern entrance to Castle Harbor; and in windy or rough weather you may not visit them at all.

The passengers at once transferred themselves to a most unseaworthy open boat that was very shallow and very broad abeam. The whole midship section of that highly specialized craft was occupied by a spacious rectangular well, like a wagon-box, with a bottom of plate glass. Around this well the passengers comfortably settled down, craned their necks over, looked down and dared the skipper to go on and make good.

At first we saw nothing but pale-green water as clear as rock crystal, and a level sea bottom of smooth white sand. Ten or twenty feet below us a few fishes slowly

swam. The boat began to move. It drifted away from the steamer for 200 feet—and then, all of a sudden, the coral reef burst upon our startled vision. It seemed to leap up at us from the ocean floor.

The reef and its medley of living forms is not away down yonder, where you see it dimly and elusively. Glory be, the top of it all truly is a "close-up," within three or four feet of the glass bottom of your devoted boat. The "ohs" and "ahs" fly around like hailstones, and each one of your colleagues insistently calls upon you to see what he sees, without any loss of time. By the time that you have gazed downward for a full minute you are fascinated by the enchanting spectacle, and your surrender to the spell of it is unconditional.

Your first impression is that you are poised motionless in the air, over a scene in Neptune's own fairy-land. *And this is literally true!* You behold a bewildering moving picture of grottos and canyon rifts, of slowly waving "sea-fans," "sea-plumes" and "sea-rods"—all of them coralline structures that look like firmly rooted sea-weeds. There are tree-like branching corals, and dome-shaped masses of brain coral great and small; but there is no white-bleached coral as you see it in shops and museums. Living coral is brown or green or amber, not white. Of true star-fishes there are plenty.

You see many, many black-spined "sea-egg" echinoderms, rainbow fishes, dense-blue parrot fishes, great round masses of amber-colored coral, and under it all that exquisite level floor of pure white sand.

The eye darts restlessly from one object to another, in nervous hurry, fearing that as the boat slowly drifts some fine feature may be lost.

With the lapse of moments and quarter-hours, the eye analyzes the various features of those marvellously beautiful submarine pictures. The foundation of all this wonderful garniture is the solid coral reef itself that so suddenly leaped up to you from the bottom. Roughly speaking it is like a great, irregularly-smooth brown wall with perpendicular sides. It is broken across, here and there, in narrow fissures that go clear to the bottom, and its walls are carved full of basins and niches of many shapes, to cradle that collection of living under-sea "curios."

The irregularities of the walls give fine holding-ground for the long, feathery corallines that slowly wave to and fro in the pulsing currents. Far down on the white bottom, or securely lodged in shelf-like basins on the side walls, you see big, black sea-urchin echinoderms set all over with long and sharp spines for protection against all enemies with teeth. And right well do those sharp and more or less poisonous spines make good. The fishes let them alone. With those spines all off, and the life out of the shell, a "sea-egg" is a beautifully white and exquisite object—but horribly fragile.

Over the reef, close up to the glass, and also down in the fissures at all depths, you see lazy and shiftless fishes of bright colors slowly swimming about as if the whole of them combined had not one care in the world. You

From a drawing by Olive Earle.

THE SEA-GARDEN REEF OFF ST. GEORGE, BERMUDA.

The wealth of corals, corallines, sea urchins, and fish life is faithfully portrayed. The sea bottom is of white sand.

notice the royal purple-blue parrot fish, and the exquisite angel-fish—most beautiful of all tropical fishes. Of the latter each scale is a gem, and each fin terminates in long, wavy threads of gold. The exquisite little zebra fishes, striped perpendicularly with black, yellow and red, are gems of the sea, fit to be mounted and worn as jewelry. They remind me of the exquisitely colored and equally tiny finches of the Senegal country, West Africa.

Of rough and rude old groupers, foul sharks and weird cuttlefishes we saw none! We saw no sting-rays, no eels, no octopuses, nor aught else to mar the beauty of that ocean paradise.

One grand feature was the flood of light from the heavens, and the wonderful white-sand reflector bottom that gave spot-light clearness and sharpness of detail to each and every object. There was nothing that needed to be taken for granted. The details were as plain as if the specimens were held in the hand of the observer. A dark bottom would have hidden much, and left much to be desired.

As we gazed and exclaimed, I thought of the refrain of a dear old sentimental ballad that I used to sing to myself when a very young voyager, much alone on forecastle decks, ploughing through strange seas, far, far from home and on the edge of Lonesome Land. It ran thus:

"'Neath the waves her spirit wanders
'Mid the treasures of the sea.
In the mystic groves of coral,
There her spirit wanders free."

Fortunate is he who looks at a sea-garden with a little knowledge of the wonderful living creatures that it contains. While not myself overburdened with information about some of those picturesque submarine forms, many of them were old friends. Those plume-like, weed-like and fan-like things are in the coral group, not among the sea-weeds. They belong to zoology, not botany, and they are known collectively as corallines. Those big, spiny eggs with long, black stickers all over them, when cleaned of their spines and interior anatomy are very white and thin, and their egg-like shells are so very breakable that they are called, in the curio-shops, "sea-eggs." They are related to the starfishes, and are classed with the Radiates.

Those miniature trees with tops of thick brown branches are not pigmy trees of the ocean, but hard branching corals, called mad're-pores. Those compact, rounded masses, mostly greenish amber in color, and very solid-looking, are masses of brain coral. Their surfaces are fantastically convoluted, a little like the surface fissures of a human brain. On the coast of Florida and at Jaffna, Ceylon, I have seen wonderful coral gardens, growing like Arizona cacti on ocean floors of level sand, but as spectacles they were not to be compared with the museum-like coral reefs of St. George.

From first to last, the cleanness and clearness of the sea, and the brilliant lighting of the whole scene, is a charm that pervades everything. There is in all that ointment only one fly—and that is the utter impossibil-

ity of portraying either in words or in pictures an adequate and satisfactory representation of that fairy-land of the sea.

Yes, there was lacking one other thing. We did not see white-bearded old Neptune, trident in hand, rise out of that wonderful submarine picture, stand upon his own fairy reef and bid us welcome and good-by.

XI

LIVING WONDERS OF THE DEEP SEAS

"I can call spirits from the vasty deep!"
"Aye. But will they come?"

WE cannot think of the deepest "deeps" of the ocean without a shudder. Being human, we love light, warmth and good cheer, and we hate heavy pressure. Down in the great depths all is darkness, icy coldness, desolation and the enormous pressure of vertical miles of overlying water. No wonder that some scared poet sang, fearsomely:

"Oh, bury me not in the deep, deep sea!"

For centuries the whole world believed that on the floor of the ocean at its greatest depths there was "no life." This was a theory based on the belief that at those unfathomable depths the water pressure was so great that no living creatures could exist. It was believed that the sea-bottom was destitute of food, and even if food were there, no well-regulated surface fish could descend to it and live to tell the story. And this last belief was quite correct.

Finally, it was also thought that, on account of the enormous pressure of each vertical mile of water, any solid body dropped into the sea presently would reach a

point beyond which it could not farther sink, but would remain there in a state of actual suspension.

There is now no reason to believe that any body distinctly heavier than water will not sink to the bottom of the ocean, no matter what the depth may be. Now, does it not make one shiver to think of a fine ocean steamer, or a ten-million-dollar superdreadnaught battleship, sinking to those depths, and total darkness, under miles of salt water? Even at 6,000 feet the pressure of the sea is a *ton* to the square inch of surface, and below that the pressure increases, at the rate of a ton to every mile of depth, until at the great six-mile depth it is *six tons to the inch!*

The ordinary light of the sun penetrates the ocean to a depth of 600 feet only, but the midsummer glare often strikes through clear water to a total depth of about 1,200 feet. This is called the littoral region; and in it marine algæ grow, and the surface fishes feed upon it.

Below 1,200 feet there is no light, no vegetable life and only carnivorous fishes can live. The Atlantic and Pacific depths are cold, and are kept almost at freezing temperature by the icy-cold currents that flow along the ocean floor from the Arctic and Antarctic seas into the great ocean basins. The deepest basins of the two great oceans are floored with clay of great antiquity, containing the lifeless remains of marine forms that have died higher up and settled down. The depths below 6,000 feet are known as the "abyssal" area; and the coiner of that name is to be congratulated on his success.

Of course the great mass of ocean fishes live in the surface or littoral area, and thus keep in touch with the world. With descent into the depths, the fish habitants rapidly diminish in number and in species, and presently there is reached a vast zone of lifeless darkness and desolation.

Naturally we should expect to find that fishes condemned to live from four to six miles deep, in black darkness (save for phosphorescence) and under the handicap of from 10,000 to 12,000 pounds of vertical pressure to the square inch of surface, would be very elementary in form, or primitive. Why should we expect fishes so living to have real eyes at all? Why should we not look for blindness, deafness, rudimentary teeth and tremendous bony armor like that of the garfishes, instead of small scales and free movement?

When you stand on the shore of a continent and behold the ocean, your mind is filled with vast thoughts. You do not think of those great waters as a place in which to swim, to fish or to dig clams. You think that you behold the edge of the world of waters, as old as Time, and greater than all the visible lands of the earth. Those waters, now heaving and sparkling in the sunlit breeze, encircle the globe, and in places are greater in depth than the height of the most lofty mountains.

You know that between you and Africa, or the islands and mainland of Asia, those depths contain a great world of living things, feeding and fed upon; reposing, fighting,

fleeing—each serving its own peculiar purpose in the great pulsating machine that we call the System of Nature. In your imagination you "call up monsters from the vasty deep"—the stupendous whale, the savage killer whale, the giant octopus, the colossal squid, the marvellous fur seal of the surface, and fishes of a thousand different shapes, sizes and kinds.

Yes; the sea that lies so serene before you contains a living world all its own, little less interesting than the creatures of the land, but far, far less known to man. The ocean is filled with mysteries, and I have now to tell you of one Great Secret that was given up by Neptune only a few short years ago. This is that secret:

Even the most tremendous depths of the ocean contain fine and perfect living fishes, that are born and reared, and that live and die, miles below the surface, under tremendous pressure, without ever having beheld the light of day, or tasted the living food of the surface.

If the waters of the oceans all were dried up or removed, a million men would rush down into the deep places to study them. And think what strange sights would meet their eyes!

They would find great benches, basins, canyons and caves. They would discover plains, hills, valleys, mountain ranges and sharp peaks of great height. There they also would find great depths such as we can only faintly imagine. When people talk of "the ocean floor" we are tempted to think of it as a vast plain; but the ocean plains are only a small portion of the ocean world.

Mount Everest, just north of India, is the highest peak of the highest mountain range in the world. To climb to its top is a task fearsomely difficult, on account of the thinness of the air and the summit storms, so that thus far even the most daring climbers have not quite accomplished it. The king peak of the Him-a-la'yas is 29,000 feet high—or 5¾ miles! That is a fearful height —almost as high as any aeroplane ever has climbed. And yet, near the American island of Guam, in the North Pacific Ocean, there is an ocean depth of 31,614 feet, which is only 66 feet less than 6 *miles!* You can remember it by the three sixes. A very short distance east of earthquake-racked Japan is the Tuscarora Deep, also 6 miles profound. In that, or in the deepest "Deep" near Guam, Mount Everest could sink out of sight and be buried under 2,614 feet of salt water. Does it not make the brain dizzy to try to grasp the idea?

All three of the three greatest oceans of our earth have great depths, but in actual figures the Pacific is the deepest, the Atlantic is a good second and the Indian Ocean is third.

Now, every one knows that water has weight. Set a full pail of water upon your hand, and it is unpleasant. Put another pail upon that and it hurts. Pile up a hundred pails and your hand will be crushed flat. A column of water a hundred feet high has at the bottom about as great weight as the trunk of a tree of that height. The more wood or water, the greater the weight; and the greater the pressure at the bottom of the mass.

At a water depth of a hundred feet a man cannot endure the awful pressure on his chest without a suit of very strong armor to protect him. Without armor—even if not drowned—his lungs could not act, he could not breathe and his blood would not circulate. Even at a depth of one hundred feet the pressure of water is forty-three pounds to the square inch of surface. A brook-trout, a crappie or a shiner could not live 30,000 feet below the surface any longer than a man could—even if an unarmored man could get there alive—because of the awful pressure of six tons to the square inch at that depth.

Most of the whales, dolphins, porpoises, sharks and ocean fishes live in what we call surface waters. The cod, Greenland halibut and many other species are spoken of as "deep-water" fishes, because they live on ocean floors that go down to 1,800 feet, and their habits differ from those of the real surface feeders. But is the cod a real "deep-sea" fish? Let us see.

For centuries the greatest depths of the ocean remained unsounded and unmeasured. Scientific men knew that great depths existed, but their ships and their reels of line could not measure them. So they said, guessingly:

"In those great depths there is no light, no food and no life. Nothing of flesh and blood could possibly withstand the awful pressure of the Great Depths. We will call them the realms of darkness and death."

But human knowledge and skill move onward. An ingenious young officer of the United States Navy, who

presently became Admiral Sigsbee, determined to sound the ocean's greatest depths, and also to measure them. He worked until he invented the Sigsbee Deep-Sea Sounding Apparatus, and made it work. His apparatus was made to register the depth of the ocean, its temperature, and to bring up specimens from the bottom. He hitched it to several miles of steel wire, coiled the wire around a huge drum on the deck of his ship and then turned it loose. The business of the ship was to hold still in its place, reel off the wire and reel it up again when the bottom had been reached and dredged. Along with this sounding work, dredges and purse-like nets were sent down, made to open only on the sea-bottom, close as soon as they started upward and hold fast to their contents.

"Hurrah for the dredge, with its iron edge,
And mystical triangle;
Its hided net with meshes set,
Odd fishes to entangle."

The results startled the world.

The gigantic depths of the Pacific were not only sounded, measured and their temperature taken, but they were found to contain LIFE! Nor was it merely low forms of life, like coral, or sea-fans, shells or even crabs. Real live *fishes* were found, in a variety of wonderful forms. If some fishes were to come from the canals of Mars they could not excite greater surprise and wonder than did those first strange finny habitants of the Great Depths.

Before the forms of those strange and new fishes could be shown and known, people asked over and over these questions:

How can they endure the enormous water pressure five or six miles down? How can they see, in that everlasting darkness, to find their food? And how can a supply of food exist there?

These very proper questions were answered, to the limit of human knowledge, about as follows:

Nature developed those fishes for life in the Great Depths. They were born there, they always have lived there and the water pressure is no more uncomfortable to them than the waters of a good river are to the black bass. With the aid of a little phosphorescent light they are able to live in that area of total darkness, and to find their food and their mates without any light whatever from the sun.

Finally, the heads of some of those fishes *are provided with dim lights which help them to solve some of the problems of their existence*, just as the coal-miner of the Past, in pit darkness, worked out his existence by means of a smoky little oil-lamp on the front of his cap. The Light-Fish is aided by its own covering of light-giving shine, which gives off a dull glow that is very helpful in attracting and selecting food. I am quite sure that if I had to live in total darkness, even 5,000 feet down in the ocean, I would promptly go to any light that might appear before me, and take my chances of being eaten. Even if one were promptly eaten by the lucky light-

carrier, would it not be more sociable and pleasant than living alone in thick darkness?

Strange to say, the deep-sea fishes have quite good eyes—contrary to the old belief that fishes living in darkness develop no eyes. It therefore seems to be true that, owing to the phosphorescence of some of those deep-sea dwellers, there are times when those eyes are useful in the daily business and pleasures of those awful depths. There are reasonable theories that cold currents flowing from afar over the ocean-bottom carry down, even to those greatest depths, enough low forms of life to feed those strange fishes.

Naturally one would imagine that any animal life born and reared at the bottom of 30,000 feet of blue salt water would be very plain and simple in form and in substance. We might reasonably expect to see bony skins, like those of the garfishes. But not so. Nature has made her deep-sea fishes with no careless hand, and no uncertain touch. One of the wonders of this astounding page in the Book of Nature is that those fishes are just as perfect, and just as cunningly designed as to form, as any other fishes we know. Let us examine a very few of them for ourselves.

We choose as the first one the wonderful *Pelican-Fish*, which is indeed well named. Its head is one-sixth cranium and five-sixths jaws and pelican pouch. At the front end of a very long, whip-like body you see the most gigantic mouth—in proportion to the length and the size of the body—ever given to a living fish. It is the main feature of the fish; and it exhibits great breadth as well as enor-

mous length of jaw. The tiny eye is at the tip end of the head. The lower jaw is furnished with a great purse-like pouch, like the elastic skin pouch of a pelican, and it is this feature that has caused this creature to be named the Pelican-Fish. Behind the great food-trap mouth there joins on a long, slender, snake-like body and tail, terminating like a black-snake whip.

It seems quite clear that this fish lived on very minute sea animals, perhaps so small as to be almost invisible to the naked eye, which were gathered in with pouches full of water, then strained out between the closed jaws, as the whalebone whales strain out the food on which they live.

When specimens of this fish are caught in the Pacific and brought to the surface from these great depths, as the enormous deep-water pressure decreases by the ascent to the surface the internal organs expand, and keep expanding, until at the surface the stomach is found to be thrust out through the mouth until the fish is almost turned inside out!

The Hedge-Hog-Mouthed Light-Fish is a deep-sea habitant of the total-darkness area, 11,000 feet down. It lives surrounded by a dull glow of phosphorescence, which is given off by a shiny coat that covers its whole body. It is about 10 inches in length, and is built on the long, narrow, water-piercing lines of a torpedo-boat destroyer. Its jaws are set with a formidable array of long, sharp teeth which must be anything but comfortable to live with. Its skin is either naked or covered with

exceedingly delicate scales. For a fish that lives in darkness its eyes are large and serviceable, by which we may suppose that the fish goes hunting and catches its prey by the aid of its own lighting-plant.

The Silvery Light-Fish is 10 inches long, and has the general appearance of the silver mullet of Indian River, Florida. Of this fish it is said that the body may be either covered with thin, easily falling scales, or entirely naked. The most astonishing features of this and the preceding species is their general resemblance to surface fishes and the size and perfection of their eyes.

The Lantern Fish is even more wonderful than the Light-Fish; for certainly its lighting-plant is the more perfect of the two. Rising from the top of its snout, and reaching far forward in a downward curve there is a stout, bracket-like arm which carries out in front of the fish a more or less serviceable light made of phosphorus. Now, the presence of phosphorus in the possession of that fish reminds us that we have in our bodies that same chemical element, and when one man's supply is collected together it makes a surprisingly large lump. But we use ours differently. That fish carries his on his head, as a practicable lantern. We suppose that it enables him to attract his food to him, and to see it when it arrives.

The Bag-Fish certainly comes next. Those vast and cavernous jaws, set with a picket fence of glittering teeth, make me think of nothing but a dredge that catches and scoops in everything before it; and the great heavy bag behind it only increases the resemblance. Upon the top

of this food-bag the real body and the tail seem to have elected to alight and hold on, without the slightest reason for the odd connection. Its catch-all bag makes about four-fifths of its entire bulk.

The Snakefish looks more like a sea-serpent than any real sea-serpent that I ever have known personally. For one-third of its length backward from the queer, wedge-shaped snout it has regular fins and gills, and looks fish-like. For the remaining two-thirds it looks like the terminal half of a boa-constrictor. Its eyes are of good size, and suggest the eyes of a bullhead.

The Blunt-Nosed Mouth-Fish is black, and it looks just like a bad dream. On the end of its blunt snout there is a pair of eyes like two bull's-eye lanterns. The mouth is cut far back, quite beyond the back of the skull, and the lower jaw is set with tall, slender teeth that look like surgeons' needles standing on end, seeking what they may devour. The tail is so absurdly small that it looks like a joke, and the fish as a whole resembles a circus tent-stake with two large, rudder-like fins near its point.

We do not know how many kinds of fishes there are in the great depths of the ocean; and what is more, *we never will know.* At a depth of four, five or six miles man's poor little nets and dredges make few catches.

"All hits are history,
All misses mystery."

But we need not worry over the number of species, or families. The great new fact is that there *is* life down

there; that life is just as complete in form and mode as it is in the fishes of the surface; and that Nature, the great Wonder-worker, has not forgotten to provide interesting living things even for the uttermost and the most dismal recesses of "Old Ocean's gray and melancholy waste."

XII

THE SOUTH POLE WONDERLAND, AND THE FROZEN PARADISE OF THE PENGUINS

SPEAKING in general terms, it may be said that the great land mystery of the South Pole remained practically undiscovered until the beginning of the present century. This was due to its great distance from all European and American centres for the forming of exploring expeditions. It requires stout hearts, nimble tongues and open purses to send ships 10,000 long and weary miles to reach the places where real exploration *begins!*

The Antarctic continent was suspected in 1812 by the *Balaena* expedition; it was openly accused by the *Antarctic* party of 1895; and at last it was caught by the hem of its robe by the *Southern Cross* party in 1900. Subsequent to that time the Antarctic challenge has been taken up by a rapid succession of daring explorers, ending with Sir Ernest Shackleton and Captain Robert F. Scott, both of whom died under the Southern Cross.

Before me at this moment, bound in gray vellum, stand two imperial volumes that make Sir Ernest Shackleton's best and most enduring monument. Their golden title reads *The Heart of the Antarctic;* and as I look upon them, regretfully because the man who made them has gone from earth, I recall the charming smile and manner of the man of whom a cynical New Yorker once

said to me in an outburst of true feeling: "Shackleton is a dear!"

These volumes place you and me in fireside possession of a fine section of the great Southland Mystery, and we must not forget what we owe to the enterprise of Mr. William Heineman, the London publisher, and the Lippincotts of Philadelphia, who did not fear to do justice to Shackleton's fine array of materials. In saying this I do so as a joint duty that I owe to the reader and to the men concerned.

This chapter is a glimpse of the new continent that has been given to the reading world since 1900, but I will not try to relate the story of its discovery. The discovery came by degrees, but yet so rapidly that now it seems like the unveiling of a colossal panorama set with natural stage properties. First we see the daring ship *Nimrod* struggling southward through tempestuous seas, and finally winning through the broken-barrier ice-pack to the dubious shelter of an ice-bound bay. On the low shelf of solid shore ice there stand flocks of weird and uncanny birds of great size, and there live herds of leopard-seals that have no foe but man.

Even if you survey all the various "Land" masses south of the known continents of the Southern Hemisphere, you will find no land animals, and above all no carnivorous land animals, such as the bear, wolf and fox. Were there any such, the penguins would not be living there. The following do exist, however, though widely scattered: the colossal sea-elephant, three species of fur-

seals and sea-lions, the leopard-seal, and in all a total of thirteen species of these Pinnipeds. Of sea birds there is a good assortment, and there are whales, porpoises and belugas, a few insects and a limited supply of fishes.

Beyond the narrow shore plain of ice and snow there appear the bare sides of wind-scarred hills of gravel and rock. Farther inland rises the rough edge of the Great Barrier, leading steeply up for 2,000 feet or so to the vast plain of level ice and snow that forms the ice-cap of the southern apex of the world.

Seek in the proper places and you will find long mountain ranges and peaks, and volcanoes both dead and alive, rising up to 9,000 feet or more. On South Victoria Land opposite Mount Markham the mountain panorama is magnificent. It suggests the Continental Divide of the Rocky Mountains from the western edge of the plains of Alberta.

Let it not be supposed, however, that to-day the Antarctic continent stands fully revealed. Far from it. It has been conquered only here and there, in shreds and patches that are widely separated by the unknown. South of New Zealand and Australia, the northern edge of the continent seems to lie on the Antarctic Circle, and it has there been touched at about ten points. The eastern edge of Victoria Land, the stage of Shackleton's Antarctic play, runs due southward toward the pole, and forms the western shore of Ross Bay. The south shore of that bay lies almost at 80° south latitude.

It was from Ross Bay that a party of Shackleton's

men climbed up the great Beardmore Glacier, twenty-three days' work, until they reached the level polar ice-cap at its summit and sped away due southward sixteen days more to within 11° 47′ of the South Pole. That was the most southerly point attained by man up to 1909. Since that time Lieutenant Scott and Roald Amundsen reached the pole itself—a perfectly smooth and level plain of ice and snow, with no landmark in sight.

South of Cape Horn, the stormy terminus of South America, and only a short distance away, rises Graham Land; but the unexplored gap eastward thereof, opposite Africa, is unbroken—save for Coat's Land—for fully one-third of the sweep of the Antarctic Circle. It is a safe guess that with all our airplanes, and also our unreliable and dangerous dirigibles, our gasolene and ships and men, the year 2024 will by no means see all the circular coast-line of the Antarctic continent accurately set forth on the maps. The challenge of the Frozen South will hang up for many a year, and the grim toll of crushed ships and dead men will steadily increase.

The Penguins

The fine ship *Nimrod* was fitted out for life and explorations on ice and snow, as completely as human foresight could provide. There were hardy Siberian ponies,—the first horses ever landed on the Antarctic continent,—motor ice-sleds, sledges for dogs and men, and sled dogs in quantity sufficient. There were houses and tents, stoves and coal, lanterns, lamps and kerosene; clothing,

food, tools, materials and medicines. There were scientific instruments, sewing-machines, cameras of a dozen kinds, a gramophone and a complete outfit for the printing of a book under the Southern Cross. There was one other item of outfit that must not be overlooked. It was the universal Spirit of Humanity toward the strange birds and beasts which Nature long ago assigned to live and maintain themselves in that terrible land of loneliness and desolation.

To all persons who are keenly interested in the daily lives of wild birds, the most thrilling features of Shackleton's Antarctic adventures were his social relations with the thousands of penguins with which he and his men and dogs associated and fraternized, particularly at their base camp on Flagstaff Point, Ross Island, McMurdo Sound.

There are many penguins elsewhere than those of Ross Island and other places on Victoria Land (near Mount Erebus), but none of them seem to have been so long or so intimately associated with man as those that entertained the Shackleton expedition. They were absolutely primitive penguins! They never before had seen men, and they knew not what it was to be attacked and killed, either by murderous sailors or savage wolves, foxes and bears. Spiritually they were living in a penguins' Garden of Eden, untroubled and unafraid. They were no more afraid of men or horses or gramophones than of the smooth, water-worn stones they collected for their nests.

There were two species, very unlike; and in all the world of birds there are few species more wonderful than the penguins.

The great Emperor Penguin was the overlord of the place. Going or coming, his bulk is enormous, his height is astonishing, his manner is imposing and his astounding form is unforgetable. Picture to yourself a tall, bag-shaped, thick-necked bird standing stiffly erect on its feet, as high as a ten-year-old boy and quite as heavy. The big ones look as if they had been inflated with a tire-pump, clear up to their skulls.

All penguins are true bipeds, with flipper-like wings fit only for swimming and fighting off enemies. They walk, stand and sit absolutely erect. To the top of his crown, standing naturally, the height of an Emperor Penguin is about 4 feet 6 inches, and its weight is about 65 pounds. In color of plumage the bird presents an appearance like that of a fat man dressed in a white shirt, white vest and baggy white trousers with a black-gray swallow-tailed coat reaching down to the ground. His neck wears a golden-yellow cravat, and a black skull-cap encases his head. The movements of the Emperor are strictly in keeping with his royal character—slow, dignified, and unruffled by trifles.

On the other hand, the Adelie Penguin is practically the reverse of all this. It certainly has a sense of humor. It is much smaller and less imposing, plain black and white in color, alert in movement and keen of mind. Its mental and moral traits are most interesting, but Mr.

Murray mournfully admits that in the serious business of nest-making the Adelies sometimes steal from one another.

Very shortly after the *Nimrod* landed her stores at Flagstaff Point, a flock of Emperor Penguins waddled down to the camp, to make a call, and to inspect the expeditionary force. The huge birds acted so much like people, and were so consumedly droll and comical, that the whole company turned out in a body to meet and to greet the delegation. The penguins treated the explorers with all the courtesy that is accorded to distinguished visitors from afar; and we are glad to be able to report that the men behaved with equal dignity and decorum. The slaughter of films was awful, but not the slightest rudeness or discourtesy was offered to any bird, and the *entente cordial* then established led to long-continued, pleasant and interesting relations.

Here is a delightful description by Mr. James Murray, the biologist of the Shackleton Expedition, from *The Heart of the Antarctic:*

"Emperors are very ceremonious in meeting other Emperors, or men or dogs. They come up to a party of strangers in a straggling procession, some big, important aldermanic fellow leading. At a respectful distance from the man or dog they halt, the old male waddles close up and bows gravely till his beak is almost touching his breast. Keeping his head bowed he makes a long speech, in a muttering manner, short sounds following in groups of four or five. Having finished his speech his head is

kept bowed a few seconds for politeness' sake, then it is raised, and he describes with his bill as large a circle as the joints of his neck will allow, looking in your face at last to see if you have understood. If you have not comprehended, as usually is the case, he tries again.

"He is very patient with your stupidity, and he feels sure that he will get it into your dull brain if he keeps at it long enough. By this time his followers are getting impatient. They are sure he is making a mess of it. Another male will waddle forward with dignity, elbow the first aside as if to say, 'I'll show you how it ought to be done,' and goes through the whole business again.

"Their most solemn ceremonies were used toward the dogs, and three old fellows have been seen calmly bowing and speaking simultaneously to a dog, which for its part was yelping and straining at its chain in an effort to get at them.

"The Emperor penguins are reported to be peace-loving birds, but when forced to fight they deliver sounding whacks with their flat, flipper-like wings, either forward or backward, and strike viciously with their sharp beaks. When pressed by men, they always slowly retreat, meanwhile as far as possible guarding themselves against rear attacks."

"Emperors were killed by the dogs," says Mr. Murray, "but it is likely that the animals hunted in couples to do this. A long fight was witnessed between an Emperor and the dog Ambrose, the largest of our dogs native to the Antarctic. The penguin was quick enough in movement

to keep always facing the dog, and the flipper and long, sharp bill were efficient weapons, as Ambrose seemed to appreciate. Only the bill was used, and it appeared to be due to short sight that the blow always fell short."

And here is an astonishing item of information regarding the locomotion of the Emperor Penguin:

"On journeys they often travel many miles walking erect, when they get along at a very slow shuffle, making only a few inches at each step. In walking thus they keep their balance by the assistance of the tail, which forms a tripod with the legs. *When on a suitable snow surface they progress rapidly by tobogganing*, a very graceful motion, when they make sledges of their breasts and propel themselves by the powerful legs, balancing, and perhaps improving their speed, by means of their wings."

But all this while we are longing to get to the Adelie Penguin, the clown of the Antarctic. My first intimate acquaintance with this gay and festive bird was through the medium of a movie screen. When we saw the perfectly astounding manner in which the Adelie comes ashore from the sea to the ice-field, it made the landing of the Pilgrims seem like a dull performance.

The edge of the ice-field was a 7-foot wall (of wet ice) rising out of deep water, against which the big waves rolled up and broke with unseemly violence. No waterfowl can land on such a shore by ordinary means. And what new process have those penguins deliberately invented for themselves?

They land by taking a shrewd advantage of Nature's

water-power resources. Swimming under the surface of an incoming wave, propelled by their flipper-wings and steered by their feet, they come straight toward the ice-wall as if to dash themselves to death against it. But no! As the wave rolls in, bearing a dozen penguins in its bosom, they leap out of its sloping side, shoot upward and shoreward in a parabolic curve and land plumb upon their shock-absorber breasts of fat and feathers 15 or 20 feet back from the edge. Although it looks like a real jolt it does not seem to ruffle those birds in the least. The leap of a porpoise is by no means equal to it. They bob up on their feet, shake themselves gleefully and off they go about the business of the day.

Mr. Murray says that the Adelie Penguin does a great deal of tobogganing to get on in the world. They go at great speed over ice or snow, but if on rocks their flippers presently are bleeding. Very rarely do they swim on the surface of water like ducks, and when they do the body sinks low in the water until only the head appears.

In the nesting season (October) and especially while on their nests, the Adelie fight courageously in self-defense, even against man after man's dangerous character has become known. With their sharp beaks they drive out in every direction, and with such thrilling effect that the men of the expedition habitually wore top-boots when visiting their rookeries. "Some of the clever ones knew that they were wasting their efforts on the felt boots, and would come up behind, hop up and seize the skin above the boot, and hang on tight, beating with

their wings. One of these little furies, hanging to your flesh and flapping his strong flippers so fast that you can hardly see them move is no joke. A man once stumbled and fell in a colony of Adelies, and before he could recover himself and scramble out they were upon him. He bore the marks of their fury for some time."

It seems positively shameless to quote anything more from Mr. Murray, but the reader really must be told two more things. The first relates to the ever-interesting subject of play among wild birds.

"The old (Adelie) birds enjoy play, while the young ones have no leisure for play, being engrossed in satisfying the enormous appetites they have when growing. Four or five Adelies were playing on the ice-floe. One acted as leader, advanced to the edge of the floe, waited for the others to line up, raised his flipper, when they all dived in. In a few seconds they all popped out again, repeated the performance, always apparently directed by the one. And so they went on for hours. While the *Nimrod* was frozen in the pack, some dozens of them were disporting themselves in a sea-pool alongside. They swam together in duck fashion, then at a squawk from one they all dived and came up on the other side of the pool."

On barren, rock-covered fields, the penguins congregate in platoons, companies and regiments, observant, serene and peaceful. Shackleton and his men walked among them day by day, and found them destitute of nervousness and fear, unafraid and totally oblivious of

the fact so well known to nearly all other wild creatures —that man is the most dangerous and deadly animal upon the earth. They posed for all the photographers, and they patiently listened to a gramophone without flinching; but I warrant you that whenever they hear some of the jazz "music" of this dreadful period they will break for the sea and plunge into it to escape from that delirium tremens of sound.

The Emperor Penguin mother of the Antarctic makes a most rugged and primitive nest. In a nice, soft spot on a rock-and-gravel hillside, with great labor she scratches out a shallow basin, and lines it with nice stones that she collects from near and far. In that she lays one big and awkward egg. She cannot sit upon her rock-nested egg, because sitting is not fashionable among Emperor Penguins, but she accomplishes the impossible and the unbelievable by standing erect over it, in such a position that an apron-like and baggy fold of her lower abdomen settles down over the egg and partly covers it. If you could see this situation, you would say that no egg thus maltreated ever could hatch in this world; but apparently the penguin's contempt of cold and scorn of heat begin in the cold-defying and heatless egg. The smaller Adelie Penguins incubate in normal fashion. They sit on their eggs like other waterfowl, and their rookery habits in nesting-time are highly interesting to those who are interested in the minds and manners of birds.

On the islands of south Australia, the commercial

From a drawing by J. Carter Beard.

THE GREAT EMPEROR PENGUIN OF THE ANTARCTIC CONTINENT.

Dwelling in a frozen paradise for flightless sea-birds, unafraid of man. A bird of many wise moods and tenses.

slaughter of Emperor Penguins began some years ago, but very promptly the Australian government stopped it.

There is one flaw in the moral character of the Adelie Penguin that for one sinful moment I was tempted to suppress. But the duty of a truthful natural historian is inexorable.

In nest-making times the Adelie Penguin actually steals! Nor is it done on the spur of the moment, or while "under the influence" of something or other common among men. No. It is done deliberately, and with cold calculation. *They steal stones from each other's nests!* For positively the last time hear Mr. Murray:

"To get enough of suitable small stones [to make a soft inner lining for a nest] is a matter of difficulty, and may involve a long journey for each single stone. The temptation is too strong for some of them, and they become habitual thieves. The majority remain stupidly honest. Amusing complications result. The bearing of the thief clearly shows that he knows he is doing wrong. He has a conscience, at least a human conscience, *i. e.*, the fear of being found out. Very different is the furtive look of the thief, long after he is out of all danger of pursuit, from the expression of the honest penguin coming home with a hard-earned stone.

"An honest one was bringing stones from a long distance. Each stone was removed by the thief as soon as the owner's back was turned. The honest one looked greatly troubled as he found that his heap didn't grow, but he seemed incapable of suspecting the cause. A thief,

sitting on its own nest, was stealing from an adjacent nest, whose honest owner was at home, but looking in another direction. Casually he turned his head, and caught the thief in the act. The thief dropped the stone, and pretended to be picking up an infinitesimal crumb from the neutral ground."

And thus and thus do we see that the twin serpents of Deceit and Crime have developed in the Penguins' Paradise, sporadically, independently and quite without aid from man.

There are, so far as heard from, no land mammals on the Antarctic continent. A great, clumsy seal called Weddell's leopard-seal, very far apart and hard to find, hauls out upon the ice-floes to find fitful rest from its life on the ocean wave. Just how long it will be before some hungry whaler without whales drops anchor off Flagstaff Point and sends a grimy crew ashore to murder all those wonderful penguins for a barrel of oil and a bagful of feathers—who can say? But *they will get there!* They always do.

And now, of the American boys who read these lines, how many will some day voyage to the savage and dangerous Antarctic continent to find undiscovered "Lands," and to name them in honor of their chosen heroes? If one of our boys discovers there a new mountain higher than Mount Erebus, and will kindly christen it Mount Roosevelt, it will greatly please me and mine.

XIII

THE LUNG-FISH OF THE FAR-OFF PAST

The Story of a Hold-Over

THIS is the story of a fish with lungs that has far, far outlived its natural fate. Its nearest relatives lie embedded in the Devonian rocks of—I hesitate to tell you—*millions* of years ago. Just how this poor orphan of the Past managed to escape all forms of destruction and live in good health and prosperity down to the present hour, many have wondered, but nobody knows.

In studying the development of animal life on this planet, the fossil remains of ancient animals are not to be flouted nor ignored. It matters not what we may *wish* to believe. Facts are stubborn things; and the wise mind will not attempt to scorn or ignore them. A fish skeleton with hundreds of feet of water-formed rock lying upon it cannot be laughed out of court, nor in any manner set aside.

People may doubt or flout "evolution" all they please, but the testimony of the rocks and the stories of their fossil animal and fish remains are eternally fixed.

Painstaking geologists have carefully studied and calculated from the layers forming the earth's crust the approximate lengths of the various periods of geologic time, and the probable age of the earth. They have fur-

nished us with reasonable and convincing proof that the earliest fishes and reptiles lived, not merely thousands of years, but actually *millions* of years ago. It takes time for a poor, finite human mind to adjust itself to that thought, and that fact; but such adjustments are possible to minds that are above those of primitive man. We do not expect the Digger Indian to comprehend the Devonian age of fishes, but to American school boys and girls it is quite understandable. The highest duty of a reasoning being is to reason.

One of the elementary results of earth-study is the proof that the crust of our earth has been actually millions of years in the forming. Scientific men have pieced together, just as the fragments of a broken bowl are put together, the various outcroppings of the rocks of the earth-crust, and have calculated the ages that have been consumed in converting skeleton-bearing lake-beds of mud or sand into plains, lofty plateaus and also *mountains* of gravel or solid rock. Long ago they revealed the positions, in the calendar of the Past, of the forefathers of certain living creatures of to-day.

For example, it is now admitted by the scientific men who are best able to judge, that the first perfect land quadrupeds took form about 3,000,000 years ago; the first perfect birds came up from the reptiles about 10,000,000 years ago; and the reptiles and frogs completed their development from the fishes about 18,000,000 years ago.

Do these figures look horribly large? Truly, they do seem so; but if we look at the hundreds of feet of water-

deposited mud and sand that formed over those groups and now lie upon them in the form of solid limestone, sandstone and shale, often as cliffs heaved high aloft and plentifully sprinkled with fossil skeletons, skulls and teeth, the figures will seem different. The span of elapsed Time that the rocks disclose makes the brain reel in every effort to grasp its full meaning.

Away back about 19,000,000 years ago, somewhere in the Devonian Age of fishes, unknown circumstances in three continents—Australia, Africa and South America—forced certain fishes to *breathe air, or die!* That was halfway back to the dawn of animal life on this planet. Many species of fishes that were confronted by that hard option did die, and left their skeletons to be entombed in what are the sandstone rocks of to-day.

But some survived—by breathing air successfully, and by developing lungs. And thus began the frogs and toads and the wonderful present-day axolotl of Mexico with the ability to change quickly from a gill-breathing pond creature to one that can travel on dry land and breathe air. It is thus that a pond axolotl saves itself from death when its pond dries up.

According to all rules of Nature, the fishes that developed lungs 19,000,000 years ago and started the great Class Amphibia, should, in the natural course of change and decay, have passed away. The wonderful, and even bewildering, array of fishes that the world owns to-day swims before us as the last exhibit of fish development, not the first. Progress has gone so far that now we have

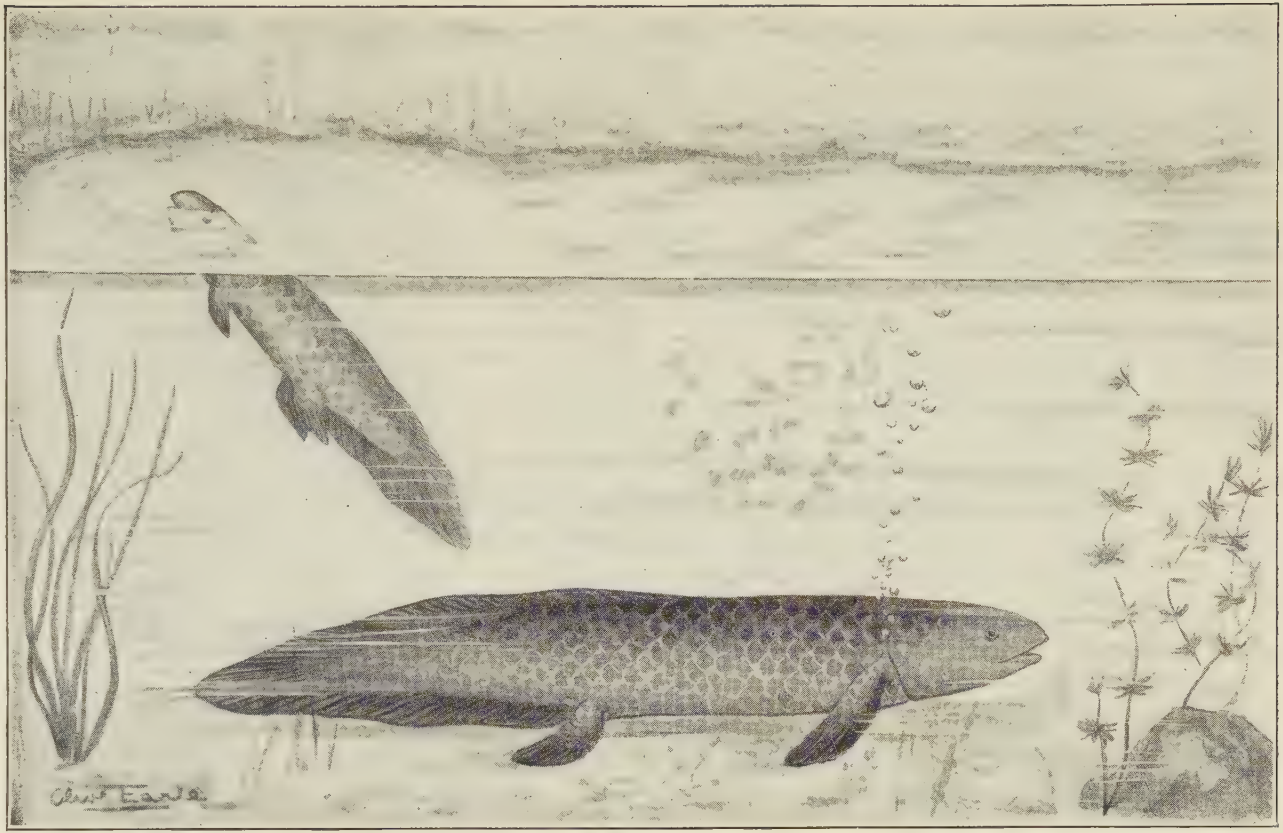
fishes that can fly, fishes that can climb trees, and fishes that come out upon the bare mud flats of the Malay Peninsula, cheerfully hop about, and loaf around in the sun, breathing air for an hour or more at a stretch. Of fishes, the Class is enormously large and exceedingly diversified as to the forms and habits of its members.

But this is not all.

In the rivers of Australia, the land of strange things, we find to-day the wonderful Lung-Fish, with the body and scales of a fish and air-breathing lungs. It belongs to an Age of Transition, or change from fishes to amphibians. The fossil skeletons of its dead ancestors as they are found in the rocks are believed by Professor Henry Fairfield Osborn to be nearly 20,000,000 years old. This fish belongs to a Past so far back that it makes one's brain spin around to think of it. The scientific men know it as the Cer-at'o-dus, and it is regarded as the most ancient of all living fishes.

There are many quadrupeds now living which link up closely with dead-and-gone species. The most conspicuous are the elephants, rhinoceroses, horses, lions, camels and bears; but those dead relatives are creatures of the very recent past, and date back only from 100,000 to 1,000,000 years, not 20,000,000. Some of them were joint tenants of North America and Europe with the caveman of B. C. 30,000, while the quagga of Africa and the arctic sea-cow (*Rhy-ti'na*) became extinct less than one hundred years ago.

The London Zoological Gardens and the New York



Drawn by Olive Earle, from a living specimen in the New York Zoological Park.

THE LUNG-FISH OF AUSTRALIA.

Its pedigree goes back about nineteen million years—but no doubt modern man soon will end it.

Zoological Park have possessed and exhibited for months living examples of the Australian Lung-Fish. This air-breathing fish is of surpassing interest because it is a direct lineal descendant of fishes that lived on this earth *nineteen million* years ago. It played an important part in the evolution—or development—of water-breathing fishes with gills into air-breathing creatures with lungs, ready to climb out of the water and travel upon land. It was thus that the frogs and toads and salamanders developed into lizards and iguanas and crocodiles and higher forms of reptiles.

The first law of evolution is: Change to something higher, or die. Nineteen million years ago—a span of Time that almost defies the imagination—the Lung-Fish was due to develop into something higher, while its original form sank into Oblivion. With all other animal forms of that far-off period, it should have gradually developed its crude fin limbs into serviceable legs, shed the surplus fin rays of its tail and become at least a land-going salamander. As a mere connecting-link species between the great Class of Fishes and the small Class of Amphibians, the original Australian Lung-Fish should have disappeared from the rivers of Australia, and gone to an honored tomb in the sandstone rocks.

But the Lung-Fish thought differently. It chose for its slogan, "Once a Lung-Fish, always one. Let the evolutions of other species go on as they please, let our children and grandchildren develop into what they choose. We, the original Lung-Fishes, refuse to change;

and we elect to go on as we are. Why should our line perish so long as water and food remain?"

And so, the *Cer-at'o-dus fosteri* has equalled the proud boast of The Pebble to The Acorn:

"I am abiding, while ages flee!"

To-day we are able to trace the rise, progress, decline and fall of the legions of giant reptiles of the Past, the development of the feather-tailed reptilian Ar-chae-op'ter-yx into full-fledged birds, and the whole procession of giant armadillos, elephants, rhinoceroses, bison and man-apes through records in the form of fossil bones that have been preserved by the hand of Nature through the ages.

To write the Story of What the Lung-Fish Saw is to write the history of the world, from the fishes to men. But what is the appearance to-day of this immortal species that even yet obstinately refuses to die?

In the autumn of 1920 there arrived at the New York Zoological Park, convoyed by the veteran collector of zoological rarities, Mr. Ellis S. Joseph, a living Lung-Fish. Its ancestral home was in a deep pool of the Barnett River, Australia. It had travelled from Sydney, Australia, without once taking food. Its length was 19 inches, which is less than one-half the length of a fully grown large specimen.

In its general form this fish suggests a long-bodied scaled carp, with the rearward half of the body slightly deeper than the front half. The scales are very carp-like; but there the resemblance ends. The tail is not

broad and divided, as the tails of our common fishes are, but long and tapering to a point. The pectoral fins (next to the gill-openings) are long, thin, triangular and pointed at the end, like the flipper of a sea-lion. As the fish rests close to the bottom these fins drop down below the body, point backward and touch the bottom, suggestive of a future development into flipper-like legs.

The swimming-bladder of this strange fish has developed as a large but very simple lung, which so connects with the mouth that the fish is able to take mouthfuls of air at the surface and fill its lung. The fish spends most of its time lightly resting on the bottom. Presently it becomes active, slowly swims round and round the tank a few times, then rises to the surface, thrusts its nose upward and out of the water, takes a big gulp of air and again sinks to the bottom.

In captivity the food of this fish consists of chopped raw beef, or frogs carved up, or earthworms; and sometimes it is said that it eats lettuce leaves. They are very subject to fungoid attacks, and this requires skilful treatment with a swab of permanganate of potassium applied every other day for about two weeks. The skin is very sensitive, and any chemical or drug of sufficient strength to clear off the fungus coating is also liable to injure the fish.

In Australia the Lung-Fish is kept in open ponds at Sydney, where it lives very successfully; but in an aquarium tank in America, supplied with fungus-laden Croton water, the results are different.

The Lung-Fish of Australia belongs to the small Order of Connecting-Link Fishes, which also contains the Mud-Fish of the Amazon, and the African Mud-Fish of the River Gambia. The "legs" of those two relatives are mere wisps of skin, but they too have air-bladder lungs and breathe air. The Australian Lung-Fish is found in the Barnett and Mary Rivers, of Queensland. It sometimes grows to a length of nearly 4 feet, and its greatest weight is about 20 pounds.

Can we now forecast the future of the Australian Lung-Fish? Most assuredly we can. Will it live on for other millions of years, or thousands, or even hundreds of years? Not on your life. Let us make no mistakes inspired by hope on that point.

We are now living in the age of far-reaching and ruthless destruction of the works of Nature. The ice age was nothing to this for the extinction of species. Boys and girls now living will see the Australian haunts of the Lung-Fish either dammed or drained for land or for irrigation, swiftly destroying the nice balance of Nature by which the Lung-Fish is even yet able to find its daily food, marry, rear healthy children and live to old age. Anything that deprives a species of its food exterminates that species. The time will come when the only haunts of the world's supply of Lung-Fishes will be glass jars and museum cases.

XIV

THE FUR-SEAL MILLIONS

THE Alaskan fur-seal, producer of the famous seal-skin coat of fashion, is one of the strangest and most erratic of all warm-blooded animals. From May 1 to September 1 its summer address is the Pribilof Islands, Bering Sea, via Alaska. Its winter home is the bosom of the broad Pacific, "far, far at sea," where truly it maintains

> "A life on the ocean wave, and a home on the rolling deep,
> Where the scattered waters rave, and the winds their revels keep."

Some of the fixed habits of this animal are so erratic and incredible that even to the professional fur-seal killers they remained shrouded in mystery for more than a century. I refer particularly to the astounding annual seven months' migration upon the deep blue waters of the Pacific Ocean.

I believe that the harassed and maltreated fur-seal has caused more controversy and fighting among men than any other wild animal. It has provoked bloodshed and murder, and at one time embroiled four great nations. It has caused the death or imprisonment of dozens of men, the seizure of scores of vessels and the direct loss of millions of dollars. Enough men to make a convention have visited the Fur Seal Islands, looked at the seals

on their rocks and gone away to write about them. Enough books have been written about them to load the largest push-cart in New York. The quarrelling over them that extended throughout a dozen years embittered many good tempers and mussed up several perfectly good reputations.

Finally, in 1911, just as the last remainders of the North American fur-seal herd were on the point of being blotted out of existence, entailing the destruction of the entire Alaskan fur-seal industry and the loss of millions of legitimate revenue, a few private citizens of New York elected to enter the lists to save both the animals and the industry. The fur-seals and the fur-seal industry were saved through the campaign started in Congress in 1911, and for two years continued with great vigor. In 1912, out of about 3,000,000 seals alive in 1875, there remained only about 120,000. To-day (1924) there are nearly 600,000.

Now, every boy citizen of America and Canada should know the strange story of this truly remarkable animal; for the fur-seal is once more a valuable national property. Very soon it will number 1,000,000 individuals, and produce an annual revenue of several millions of dollars.

In the first place the fur-seal is not a true seal at all. It is a small and furry-coated sea-lion, with a long, supple, reptilian neck and head. Its front flippers are naked of hair, triangular and sharp-pointed. It is classed as a "pinniped," or "fin-footed" animal. Instead of being

bag-like, clumsy and almost helpless on land, as all the true seals are, it is as supple as an eel, as nimble as a goat and it climbs rock cliffs sixty feet high just for fun, and to look at the scenery from their tops. In the water, no other quadruped that swims surpasses this water acrobat as a surface feeder and in-and-out diver.

In the second place, the fur-seal does almost nothing that a true land-going animal does. From its cradle on the Pribilof rocks to its uncertain grave it does everything differently and strangely. In many ways it is a living bundle of contrary and unexpected actions. Where it should be most wise it is most foolish; but in its own line its real wisdom is almost beyond the comprehension of man. The fur-seal hunters and writers have contributed to this outlandish situation by calling the big males "bulls," the middle-aged males "bachelors," the females "cows" and the infants "pups"! Can any naming of animals be more absurd or ill-conditioned?

The strange and erratic nature of the fur-seal begins to manifest itself as soon as the vanguard of the great swimming army begins to arrive at the Pribilof Islands, in Bering Sea, about May 15, of each year. The oldest and largest males are the masters of the herd, and each one knows precisely what he intends to do. Each one picks out a soft spot on the "hauling-grounds" (where the herd "hauls" out), and on the gently sloping shore of sand or the jumble of smooth rocks he establishes himself for the season. Around him he gathers, by coaxing, whistling or roaring, or by sheer strength of jaw and

domineering will, a bunch of from ten to twenty female seals, and they constitute his "harem."

If a passing female is reluctant to come in, or seeks to go elsewhere, the "old he-one" rushes at her, seizes her by the back of the neck, and with loud roars of indignation fiercely drags her into his circle. A "cow" that attempts to escape to a neighboring harem is instantly pursued and brought back, and if the master of the other harem rushes down to interfere, there is a great fight. Each master of a harem savagely fights off all other big bulls who try to trespass upon the ground occupied by his harem, and savage combats over female seals are of frequent occurrence. Sometimes the females, which are of far smaller size than the big and burly harem males, suffer severely.

In his book on Alaska and the fur-seal millions, *Our Arctic Province* (Scribner), Mr. Henry W. Elliott records this tragic incident of fur-seal life on St. Paul Island:

"When the females come ashore there is no sign whatever of affection manifested between the sexes. The males are surly and morose, and the females entirely indifferent to such reception. They are, however, subjected to very harsh treatment, sometimes, in the progress of battles between the males for their possession, and a few of them are badly bitten and lacerated every season.

"One of the cows that arrived at Nahspeel, St. Paul Island, early in June, 1872, was treated to a mutilation in this manner under my eyes. When she had finally landed on the barren rocks of one of the numerous

From a drawing by J. Carter Beard.

THE FUR SEAL MILLIONS OF ALASKA.

As they once were, and again will be.

'seecatchie' at the water-front of this small rockery, and while I was carefully making a sketch of her graceful outlines, a rival bull, adjacent, reached out from his station, and seized her with his mouth by the nape of the neck, just as a cat lifts a kitten. At the same instant, almost simultaneously, the old male that was rightfully entitled to her charms, turned and caught her in his teeth by the skin of her back. There she was, lifted and suspended in mid-air, between the jaws of the furious rivals, until in obedience to their powerful struggles the hide of her back gave way, and as a ragged flap of the raw skin more than six inches broad and a foot in length was torn up and from her spine, she passed with a rush into the possession of the bull which had covetously seized her.

"She uttered no cry during this barbarous treatment, nor did she when settled again turn to her torn and bleeding wound to notice it in any way whatsoever that I could observe."

In the spring the fur-seal babies are born, on the summer hauling-grounds. All summer long the mothers leave their young at intervals, and swim westward about 120 miles to good fishing-grounds, where they get abundant food. During this absence the "pups" have nothing to do but sit tight, and patiently await the return of their mothers.

On returning to their places on the hauling-grounds, the seal mothers have no difficulty in finding their own pups, waiting and hungry. It was only a few years ago, previous to the making of the international treaty

that stopped the frightfully wasteful practice of killing seals at sea that between forty and fifty vessels of the Japanese seal-poachers used to form a semicircle in front of the hauling-grounds, and shoot the mother seals as they endeavored to come and go in search of food. Now, all that has been stopped by the treaty; and Japan and England receive annually cash compensations for their adherence.

No one can feed fur-seals, nor stop their strange comings and goings. On land they are fatally indifferent to man, who is probably the most savage and wasteful animal that the world ever knew. There is one vital point, however, in which their natural fear instinct seems to fail them. The young male seals, three years old and known as "bachelors," stupidly permit themselves to be sorted out by the native seal-killers, herded together, and then calmly driven two or three miles, for slaughter on the "killing-grounds." Their fear instinct should lead them to stampede for the sea the moment a man appears among them and makes a noise. If they did so, only a few could be caught or killed. When the seals are at sea, migrating, they are wild and wary, and not easily approached.

Droves of young male seals were—and still are—driven like sheep to the shambles of slaughter. From 1870 to 1880 about 100,000 fur-seal bachelors were killed every year by contract, for their fur—clubbed to death on the open prairies of the Pribilof Islands, by Aleutian natives living permanently on the Seal Islands for this work.

We come now to the most wonderful feature in the life history of this remarkable animal. *It is a fixed annual migration promenade of the millions on the surface of the sea!* The breeding-season is over by September 15, and soon thereafter the great migration begins. Promptly the seals begin to leave their summer home and put to sea, and by November 1 not one remains! And then what?

Until a few years ago, no one knew what. Then, however, by collecting evidence from the log-books of scores of ships, and putting together their records of fur-seals seen at sea, the mystery was unravelled.

The fur-seal millions make each year a cruise of about 6,000 miles without once touching land! They are at sea nearly *eight months* of each year. They take all their pups with them, and they catch fish for food, eat and sleep on the surface of the sea. Mr. Elliott thinks that for six months the pups live on squid and surface crabs and shrimps. The young fur-seals often are carried on the bodies of their mothers, and also sleep there! Being decidedly heavier than water, and sure to sink to the bottom whenever they are shot and killed at sea, *how* do they keep from sinking when they sleep? It is a puzzle, and I give it up. All we know about it is that *they do it!*

We can understand how the fur-seal regiments, brigades and divisions can get on in calm or mild weather, but here is one man who cannot understand how they carry on without actual drowning through the awful storms that frequently lash the surface of the Pacific into a wild chaos of tremendous seas, of boiling waves and spindrift.

How can the fur-seals fight such conditions for two, three or four days and nights without finally becoming exhausted by the struggle, and drowning? And how do they keep from becoming hopelessly scattered?

But, no matter what the methods of self-preservation may be, the fact is that the fur-seals do go through even the most terrible storms at sea, and come out of them alive, and well, and prosperous.

When they leave their beloved islands, because of the cold weather there in winter—the swimming multitude passes through the long chain of the Aleutian Islands, and heads straight out to sea, as if intending to land at San Francisco. The southerly margin of the herd finally points toward Santa Cruz, but no seal intends to make a landing there or elsewhere. Just off the Farallone Islands, with the light of that lighthouse kept on their starboard bow, the swimming mass swings sharply to the west and heads northward, parallel with the coast of California.

In February, 1922, the light-keeper of the Farallone light reported having seen from the western end of that group the approach from the south of an army of swimming seals, with a well-aligned front about three miles wide. He estimated that the herd in sight on that occasion contained 10,000 head of fur-seals. He said that when within about three miles of the southern front of the Farallones, the animals in the front line seemed to rear up in the water, as high as possible, and take a good look at the land. Then, in good formation, the whole

body tacked off to the westward, passed the islands at a safe distance and kept right on until lost to view toward the north.

To me it seems very strange that seals four or five months at sea should have no desire to land upon any of the beautiful sand beaches of the California coast to rest, and bask in the sun. But they do not. After rounding the great bend, on they go toward the Pribilof Islands, as if their lives depended upon their getting there without a moment's delay. They keep between 100 and 200 miles off shore, pass through their favorite openings in the Aleutian chain of islands, *never once touch land* and about May 5 the first of the old bulls begin to arrive at their islands. The cows follow them in early June, and by that time the bulls are all located, and ready to form their harems.

The Steller sea-lion and the California sea-lion act differently. They are confirmed coast-dwellers, on the sandy shores at volcanic Bogoslof Island, and on the long coast of Vancouver Island, Washington, Oregon and California. They have violent objections to the making of long and dangerous voyages at sea. For this reason they are easily killed by shooting. The savage and gluttonous orca, or killer-whale, "eats 'em alive," and sometimes will eat from five to seven whole sea-lions (of medium size) at one meal.

In intelligence and temperament the fur-seal is one of the most remarkable and interesting of all wild animals. On this subject a long chapter might be written.

Mr. Elliott found by experiment that when he persistently attacked a harem bull, and harried him, the bull fearlessly rushed for him, roaring lustily; but it was only to repel the attack. The bull refused to assume the offensive.

In the bays opposite the breeding-grounds, small herds of seals frequently become sportive, and most entertainingly played and romped around passing boats. At sea, however, this habit is totally abandoned for a watchful and suspicious attitude. I think that no one can explain from the evidence the reason why the seal herds always pass the Farallone Islands and the Aleutian Islands without even once stopping to go ashore. Many persons have entertained the idea that the fur-seal can be managed as a stock-breeder manages his domestic cattle, but man's influence on those herds is limited to his killing operations. All the rest of the fur-seal's life is governed solely by his own erratic, contrary and utterly ungovernable will. The resentment of man's interference is so pronounced that it is a very difficult matter to rear young fur-seals in captivity, and to induce adult seals to accept captivity and live under its conditions.

It was in 1912 that the Alaska fur-seal situation was completely reformed, first by a special Act of Congress, and then by an international treaty, negotiated by Secretary of State Knox, between England and Canada, Japan, Russia, and the United States. By that treaty all the killing of seals at sea was stopped. A five-year close season was given the Alaskan herds, to enable them to

recuperate and make a fresh start in life. The killing of our seals by contract, with a private company at a fixed price per head, was ended forever. Now, all the killing is done by agents of the United States Government, and when the skins taken are sold each year in the fur market, Japan and England each receives a fixed percentage of the net profits, as compensation for their participation in the treaty.

But for this wise and vitally necessary treaty, the fur-seal millions of Alaska would, beyond all doubt, by this time have become practically extinct. Now, we look forward to the time when those seals will again number at least 2,000,000, and yield to our government annually several millions of dollars in legitimate revenue.

XV

THE RIVER GRAND AND TERRIBLE

"Go, stand upon the canyon's rim
And gaze far down the dark abyss.
Blink at the scroll of Ages dim,
And ask thy neighbor, 'What is this?' "

—*The Spell of the Mountains.*

ONCE in a flight of imagination I stood upon the roof of the world, and in my mind's eye all the great rivers of the earth rolled before me in a panoramic review. By one means and another I knew all of them. Some I had learned by personal contact, others through the eyes of other men. It is not always necessary to be burned by a fire in order to give testimony of its warmth; and long ago the world decided that a historian need not be killed in a battle in order to prepare a history of it.

In my review of the great rivers, can you guess which one stood out most boldly and most awesomely? Cover the page below this line, and see if you can guess the name.

It was the River Colorado, of the Grand Canyon of Arizona. As you gaze upon its wide sweep of smooth blue water at Yuma, it gives you a thrill to think of the wild and terrible canyons through which those waters have rushed.

For forty years I have been acquainted with that terrible stream. I learned it first through its dear old

first explorer, and later on through other explorers who had gone through it and lived. I know it also by slight personal contact; and this is the first time that I have put pen and paper together to write aught about it. Excellent and beautiful books have been written about the Rio Colorado—but alas! such books do not travel far enough among the millions of this day.

Nominally, the Grand Canyon, a mile deep and thirteen miles across at Bright Angel, was formed in order that the terrible Colorado might run through it from Wyoming to the sea. Ay, but *how* was it formed? "By erosion?" We doubt it, very hard. *The rim is too high for that!* No sensible river ever attempts to cut out a canyon-bed for itself by beginning along the top, or even on the side, of a high plateau of solid rock.

I think the best guess is that 5,000,000 years ago, in the days of the dinosaurs, a vast internal ruction of Nature coming from within Mother Earth, heaved up a great ridge of the earth's crust, until it split open, its sides flared apart, and it formed the canyon of the Colorado. The ordinary processes of wear and tear by rivers in cutting their way through mile-high mountain ridges of rock are not alone sufficient to account for a chasm hundreds of miles long, a mile deep and in places twelve miles across from rim to rim. Why should a river waste so much energy in rock excavations? To assume a huge upheaval, and a chasm already blocked out for the Colorado puts less strain upon the imagination.

I regard the Grand Canyon of the Colorado River as

the most stupendous river wonder of the world. By all means "see America first," and begin with that. All pictures and descriptions fall miles short of one day of the real thing. As I stand upon the rim of it, anywhere, it makes me feel as if I were a tiny insect. If that chasm cannot take the excess ego out of man, nothing short of a high mountain top ever will. You will notice that people do not chatter nonsense on the Rim. It sobers even the most frivolous.

The Grand Canyon of the Colorado, with an anteroom called the Marble Canyon, is 283 miles long; and nearly every foot of it is a death-trap. At its flood state it rises from 30 to 60 feet, and carries more water than the Niagara River originally carried over Niagara Falls. It is a great mistake—but alas! too late to correct it—that the upper third of the Terrible River is called Green River, and does not take on its real name until away down in southwestern Utah, where it receives from Colorado the waters of the Grand. Those who wish to risk their lives in the canyons of the Colorado usually take off at Green River City, southwestern Wyoming, which is about 1,600 miles from the delta at the head of the Gulf of California. The descent is a little over *six thousand feet!*

The dangers of the Colorado River are like the jaws of a colossal crocodile. On either side there is a deadly array of death-trap cliffs and rocks, and in between them is the wide-open, all-devouring and ever-voracious maw, always ready and eager to devour more boats and men.

First, middle and last is the plunging descent of wicked water raging over and amid big rounded granite boulders and huge masses of angular rocks that have fallen from the white limestone and red sandstone cliffs above. For years I have been waiting for a huge mountain mass to break up and fall into the Marble Canyon blocking it from wall to wall for 500 feet up. The almost endless rapids are the great and dominant danger. They seize boats and play with them, whirling them around, and dashing them to fragments against midstream rocks.

The wrecked voyager may be dashed against a rock and instantly killed; but if merely half-drowned he may be washed ashore, or possibly swim ashore. In either case he lands on a narrow chaos of fringing rocks, at the foot of an enormous cliff wall of rock. He may find himself unable to go forward or back, or to climb up, and possibly he is elected either to starve or to drown. Possibly, however, the Fates may have been kind enough to cast him ashore near the mouth of a crack in the wall called a "side canyon," up which it may be just possible to climb out of the great death-trap, up to the world above. In 1869, twenty-five miles from the mouth of the Grand Canyon, O. G. and Seneca Howland, and W. H. Dunn left Major Powell's first expedition, and climbed out of the canyon on the north side, only to be murdered near Mount Dellenbaugh by Ute Indians. In that same year in the Marble Canyon F. A. Nims had a bad fall, sustained a broken leg, and was taken out of the Canyon over a 1700-foot wall.

In 1882 I was proud to shake the left hand of brave Major John W. Powell, then Director of the United States Geological Survey, and see his winning smile. It thrilled me, from head to foot, to see and to touch the man who, with his good right arm gone forever, had *dared* to risk the first, and therefore the most hazardous, complete exploration of the most dangerous and terrible river of the world. When he and his bold men left Green River City, Wyoming, for their great adventure, he was solemnly assured that there were deadly waterfalls in the Colorado, that in at least one place the river ran through a subterranean passage, and that no one who had tried to explore it had emerged alive.

Since that day I have known Langdon Gibson, J. K. Hillers, Frederick S. Dellenbaugh and the wonderful Kolb brothers, a group of men who have voyaged and fought with the Colorado from Green River City to The Needles of Arizona and the Gulf of California.

Godfrey Sykes swam the Colorado, below Colonia Leredo, to save himself from sure death by starvation on the western delta plain; and you can find his heroic story written into a book with red covers called *Camp Fires on Desert and Lava.*

No one ever will know how many men or how many boats have lost their lives in the raging rapids of the Colorado. In addition to death-dealing rapids and rocks, the astounding swirl, the awful undertow and the fierce undercurrents of waters heavily charged with fine sand, or "silt," make death perils to beset the boldest and best

swimmer. The Kolbs found that the water in Lodore Canyon contained 20 per cent of alkaline silt! Even at Lee's Ferry, where the death-dealing waters run smoothly —but where they rise in flood time 45 *feet* or even more— men who have been swept off the ferry-boat instantly disappeared and never once came to the surface. Ellsworth Kolb says that the clothing of drowned men quickly fill up with silt and sink them to the bottom, where more silt covers them up forever. It is really common for explorers of the Colorado Canyon to come upon the bodies of dead men that have been washed upon the rocks before the waters had time to bury them with silt.

The Kolb brothers, whose wonderful moving and still pictures of the Colorado and its canyons have made them famous, always choose periods of low water for their voyages through the great death-trap. They point out that in the flood season, when the river is dozens and even scores of feet above low water, the dangers from drowning are greatly increased. The raging waters race between smooth canyon walls, where footing is rare or absent, and the boiling caldron plays havoc with boats that try to keep right side up on its surface.

If you ever go out in search of hero tales of exploration, go straight to the Rio Colorado, and canvass its returns. The challenge and the defiance that it continually roars to man has lured many a bold and dauntless spirit to his death. Right well might the whole stream from the head of Lodore Canyon onward be called the Rio del Muerto—the River of Death. Read first of all—

because of its glorious picture exhibit—the thrilling story of Ellsworth L. Kolb, *Through the Grand Canyon*, then Dellenbaugh's *Romance of the Grand Canyon* and then for a glorious finish the narrative of the grand old man, Major Powell.

It is said that no one can appreciate the awful grandeur, the gloom and spiritual oppressiveness of the sheer rock walls of the Colorado Canyons, save those who have been through them. Fancy a big, raging stream racing downward twenty miles an hour over a bed of big rocks, through a rock canyon only 400 feet wide, between perpendicular walls of rock rising from 1,500 to 2,700 feet high up to the *first bench!* One of the fearsome things about the Grand Canyon, away from the roar of the river, is its deadly silence and its overpowering vastness. Really, is there anywhere anything else like it, or equal to it? To my mind it surpasses the Falls and the Rapids of Niagara.

And yet, if this towering majesty and crushing immensity of chasm and abyss is felt in the silent places, what must be its final effect when supplemented and dominated by a racing, raging, foaming, roaring, death-dealing river torrent? Surely none but the stoutest hearts and the toughest human fibre can long withstand the soul-depression and the genuine terrors of these crushing influences. It is no cause for wonder that occasionally a salaried member of an exploring party breaks under the strain, and receives permission to withdraw from the terrifying adventure and climb out of the canyon if he can.

From a photograph by Kolb Brothers, Grand Canyon, printed by permission of the Macmillan Company.

THE GRANDEUR OF THE TERRIBLE COLORADO RIVER.

The finest view in the Grand Canyon of the stream that here looks small, but carries as much water as the Niagara.

It has been for a variety of reasons that men have braved the dangers of the Colorado voyage. Major Powell and several other men went through in the hope of finding a practicable route for a Grand Canyon railroad. The Kolb brothers went for photographs. Nathan Galloway, a fur trapper, for years wrestled successfully with the rapids and canyons of Green River and the Colorado, and finally died in his bed. In 1869 Russell and Monette, prospectors and miners, went through clear to The Needles, prospecting. In 1923, a government party from the United States Geological Survey almost perished trying to figure out the possibilities of damming the Colorado and utilizing its now wasted waters in useful irrigation projects. Will the development of arid lands eventually take the color out of the Colorado as electric light, heat and power plants have taken the water from Niagara Falls? Only the Sphinx of the Future can answer; but at present I will back the bad river against the irrigators.

And what, if any, are the wild animals bold enough and hardy enough to inhabit the grand, gloomy and dangerous canyons of the Colorado? First and foremost, the Grand Canyon is inhabited by a few small bands of mountain sheep. Secondly, at long intervals it is visited by bands of mule deer from the Kaibab Plateau, which is on the north side, opposite the El Tovar Hotel. A band came down Trinity Creek in 1922, to the lowest bench, and was seen and photographed by the Kolb brothers.

Finally, and most surprising, two men from Hermit Camp found on the south bank of the Colorado River, at the lower end of the Hermit Trail, a *female pronghorned antelope,* all wet, as if she had been in the river, perhaps attempting to swim across. She must have been an absconding wife from the very small bands of antelope known to range about twenty miles south of Grand Canyon Station.

The wanderer became frightened at the men who discovered her, and tried to escape up the southern rocks. At once she had a bad fall, and injured her spine so seriously that instantly she became unable to stand. Then those two gallant fellows actually caught that wounded animal, *carried* her up to Hermit Camp, and kept her there under treatment, for two days. Then she died. Can any one beat that for humanity?

Mr. Ellsworth Kolb says that in his opinion the whole number of mountain sheep in the Grand Canyon must be very small, probably fewer than one hundred head. Mr. Kolb has lived there continuously for twelve years, and his opinion is valuable.

It is well known that many mountain lions live—or I will say that they once lived—along the rocky northern rim of the Grand Canyon, in close liaison with the mule deer that now are so numerous on the Kaibab Plateau. Although those pumas once killed many deer—before the Forest Service men killed them—they made no visible impression on the deer population.

Are there any fish in the Colorado of the Canyons?

Truly, there must be. Higher up, the Kolb brothers found in Green River, at the head of Lodore Canyon, a lot of suckers and catfish and one buffalo fish, struggling mightily to live in spite of the awful quantity of silt that threatened to destroy them.

XVI

THE SUMMITS OF THE CANADIAN ROCKIES

"Here in the workshop of the Sun,
Where Nature hews and chips recoil,
Note well the things designed, or done;
Behold the Mountains at their toil!"

—*The Spell of the Mountains.*

ONCE upon a time my good friend John M. Phillips took me to some Delectable Mountains that he and his wild-western guides had discovered, and carefully preserved from the spoilers by not telling of them. Ever since that soul-stirring event I have wished that I could gather up all my friends, land them safely on those summits and say to them: "Now, be happy!"

In my time I have seen and done many a mountain, and crossed many a range to see what was on the other side, without troubling my friends with them afterward. I have made a fuss over two ranges only, the Elk River Mountains of British Columbia, and the lava mountains of northwestern Sonora, Mexico, called Sierra Pinacate.

For thirty days in the glorious September of 1905 we were in an unspoiled Rocky Mountain paradise. The scenery was by turns interesting, beautiful and grand. The wild-animal life was varied, abundant and in the highest degree interesting. There were a few "squaw-hatchet" marks, but there was not an axe mark anywhere save those that we made; and there were no ashes

of other men's camp-fires. Perhaps a mighty good camp cook and very genteel company had something to do with the tinting of our mental color-photographs; for their influence was potent.

Those amazing thirty days now look to me like the staging of a fine play. The stage properties were new and fine, and both dialogue and action were perfect. No one stubbed his toe, no one staged an accident, no one even got lost. While running on the frosty tops of the jack-pine logs in "down timber" I had one terrific fall, but calamity never touched me. There was not one fly in the ointment. I mention all these tiresome details to show the reader that there can be such combinations as the above, and it is right to hope for one, some time, somewhere.

The month of September was well chosen. It was neither too hot nor too cold, too early nor too late. All the wild animals were fat and prosperous, and none of them had denned up for the winter. The little haymaker pikas were curing their winter supply of forage, and the bears were in the act of shifting from huckleberries to ground-squirrels before denning up.

There we found mountains at their toil—doing things, day by day. We saw the Sun, the Wind, the Rain and Jack Frost paring off those rocky peaks and knife-edge summits, throwing down billions of tons of well-broken slide rock and then rushing it down toboggan-slides on avalanches to dump it into the V-shaped valleys below. Thus were two tasks being accomplished at the same

time. The summits were coming down toward a basis of comfortably rounded hills, and the difficult valleys were being filled up to provide practicable road-beds, level fields and green pastures for future generations of men and beasts.

Now, to the young mind this may at first seem not so interesting as a story of a bear, or even of a live chipmunk; but just now I wish to show the young reader that there are some things in Nature's wonderlands of greater interest than animal stories. I hope some day to take my grandchildren by their small hands, climb with them into certain places of the Elk River Range and point out to their wondering eyes the *mountains at work*, just as 10,000 other mountain summits have been working for a million years. We must not think the mountain summits always have been as they are to-day, or that they always will remain as they now are. This is a world of constant changes.

It is dangerous to travel in those mountains in April and May, on account of the many avalanches. Up in the summit areas, the mountains are high, very steep-sided—where they are not perpendicular—and the valleys are sharply V-shaped. Yes, we *can* follow a summit for a short distance; but it is very difficult and dangerous work. Down in the bottoms of those notch-like valleys the melting snows and running waters of warm spring weather send awful avalanches rushing down with terrifying frequency and resistless power. A typical "snow-slide" will start away up yonder at the foot of a tall cliff,

From photographs by John M. Phillips.

THE MOUNTAINS AT THEIR TOIL.

The stratified rock is broken up by the elements, and falls as "slide-rock." The light track below the White Mountain Goat is the highway of the avalanches that carry the broken rock to the bottom of the valley.

THE AVALANCHE ROAD

Used every spring, leading from the goat's cliff to Avalanche Creek, about 2,000 feet below.

gather speed, power and snow as it goes, pick up tons of slide rock, shoot with the speed of an express-train down a steep slope half a mile or a mile long, tear loose and carry along every forest tree and bush that stands in its path and with a grand crash and smash land the whole scrambled mass at the bottom of the valley. After two or three years the tangled mass of dead and barkless tree trunks makes you think of a pile of bleaching bones.

Usually the water of the mountain torrent most concerned finds its way under the mass, or else around it. Lakes rarely are formed, because these rock-and-tree dams do not hold water.

In those mountains, and in all others like them, life and progress is one long climb and scramble. The valleys that have any width nearly always are filled with evergreen timber and bushes, wherein, or beside which, you can build beautiful camps. The ever-present clear and cold mountain stream is there, for all purposes save autumnal bathing. If you once go in swimming in those glacier-fed, ice-cold waters you never will repeat the experience. When Mr. Phillips tried it, his yells rang out afar; and even the horses laughed.

The evergreen trees bravely climb up all the slopes until they reach the feet of the sheer rock cliffs, or else the timber-line, but their dark-green mantles are badly scarified up and down by bare and treeless streaks, showing where avalanches have ploughed through them and left wide swaths of bare rocks and soil.

In sunshiny weather those climbing forests are not

quite so beautiful nor so interesting as under certain other conditions. On cloudy and gray days, and especially on rainy days, their colors show at their brightest and best; and then the mountains are decidedly beautiful. The gray of the rocks, the dark green of the spruces and cedars, the purple of the ironweed and the pale yellow of the larch and willows all are intensified and brightened like a newly varnished painting.

To my mind the most beautiful lakes in the world are the small summit lakes that are surrounded by high mountains. Sapphires and emeralds set in gold are not half so beautiful as they. I think that the most beautiful of all mountain pictures are those of deep-blue glacial lakes with green edges, surrounded by slopes garnished with evergreen timber and walled in by "ye crags and peaks."

Those delectable Elk River Mountains have many moods and tenses. For the joy-climber there are long, steep slopes that furnish trial trips of sheer endurance in legs, heart and lungs. Every summit is a distinct challenge to "come on, and see what is on the other side." The bold, bad cliffs are away up yonder, and he who can pump his way up to a remote cliff foot, and then win on up to the top of it, is a good one. Slide rock high and steep is something that no tender feet can make light of.

Those cliffs have surprised many an experienced climber. Once old John Norboe, while out on a scouting trip for mountain sheep, got into a mix-up with a precipitous rock cliff that scared him most soundly. He said:

"I started to climb up a bad place, and when I got away up, *I found that I couldn't go on, and I couldn't get down!* For a while I just hung on, and wondered how many days it would take these boys to find my body."

Finally he managed to take off his shoes, and hang them around his neck. Then he got his nerves back, and succeeded in climbing on up. He said:

"I saved my bacon; but I haven't been so skeered in years. It's lucky I didn't have my gun with me. I'd shore a-dropped it!"

For the reflective explorer who occasionally likes to indulge in a good long think, a day all alone on the summits is a mighty wholesome thing. There is nothing else —of a mild and inoffensive nature—quite so good as that to take the swelling out of a human head. As the egotist climbs alone, his self-esteem gauge gradually registers lower and lower. He begins to find that man is not the whole thing in Nature after all.

When finally he stands upon the summit, looks all around him for thirty miles or more and realizes what a poor, weak and puny thing a solitary man really is, involuntarily he takes off his hat. As he gazes in silent awe at the gigantic panorama unrolled at his feet, he sees a circular labyrinth of peaks and cliffs, of steep slopes, acres and acres of slide rock, scores of avalanche tracks and a network of deep-plunging valleys. As he notes the cycloramic maze of forests, streams and lakes, inhabited by bold and hardy wild creatures, and feels the cold and fierce pressure of the summit wind, the natural egotism

of the man sinks to zero. It is as if he had been given a view of himself through a reversed telescope.

It is up on the summits above timber-line, and all alone, that a man most thoroughly realizes how little he knows about the economy of Nature in that stupendous and difficult realm. He sees the sturdy white mountain goat, the wary bighorn sheep, the cheerful grizzly bear, the surly hoary marmot, the bad wolverene, the wise little pika and the hazard-taking ground-squirrel all dwelling up there, all winter long, by their own wits and industry. But about all this there is much that the explorer does not know nor understand. Those wild creatures of the summits do what *no man ever does*, unless he is backed by "the government," and is provided with a ready-made house, well stocked with food and drink carried up from below.

The solitary summit-climber finds much that fills his soul with awe and his mind with new thought. As he fearsomely picks his way, rifle in hand, along a knife-edge summit, with a dangerous slope of slide rock on one hand, and a drop of a thousand feet sheer on the other, the ever-present summit gale sweeps against him, and makes him bend low to maintain his footing. A fall either way means certain death—on the left by one plunge and a far-down crash, on the other by a battering roll to the bottom of a murderous slope. Shivering, he hastens along, to find less dangerous footing, and better holding-ground for his ego.

In the friendly shelter of the 6-foot pines and cedars

of timber-line, the wind whistles through the gnarled and twisted branches, and threshes, as it has for a hundred years, that dwarfed and uncanny forest. Those caricature trees show what a fight the tree flora of the mountains has been making to clothe those naked summits, and retard the wastage of erosion.

A little lower down, the sharp-pointed tops of the taller and partly sheltered pines and cedars come up from below to the level of the climber. The wind whistles through them, and from a solitary tree-top a Clark's crow, clinging strongly, sends forth his rasping cry. From the naked cliff wall that rises ahead comes the crack and rattle of falling slide rock, showing that in good sooth the elements are at work wearing down the precipice and casting it down to the clutch of the avalanches.

I cannot understand how amid the solemn grandeur of such mountains as those it is possible for any man with a soul above that of the most sordid wolverene level to be really bloodthirsty or cruel in his treatment of the wild animals. We killed less than one-half of the big game that a fairly stringent law permitted us to take. On subsequent trips to that country Mr. Phillips shot next to nothing! He went merely to taste anew the joy of the mountains. In 1905 we saw *one hundred and forty-three* white goats, and right easily could have killed our full legal limit. But for us "the limit" was too high, and we advised that it be lowered—40 per cent.

We needed a total of six goat specimens and three

sheep; but, believe me, the goats were ten times more interesting alive than they ever have been dead. The stately bighorn sheep, the lordly mountain elk and the sturdy silver-tip grizzly all are there, and if those grizzlies ever kill a big-game animal for food it is so rarely done that we found no evidence of it.

Those Delectable Mountains, that we found just thirty miles west of the continental-divide boundary between Alberta and British Columbia, are to-day more delectable than ever. In 1908 the Canadian Government elevated that whole range and much more—550 square miles in all—into the class of game sanctuaries, and thus it remains to this day. The wild animals have very greatly increased. Elk have become plentiful—"thousands," they say—and moose have come in and bred until they also are now abundant.

Now is it not fine to know that that particular one of Nature's green mountain wonderlands has not been shot to pieces and devastated by bloodthirsty hunters and relentless trappers? There, every prospect pleases, not even man is vile, and may all of it so remain for a thousand years.

P. S. The way to reach it with your camera is from Michel or Fort Steele, on the Crow's Nest Branch of the C. P. R.

XVII

A HUNTER'S PARADISE IN INDIA

IN good sooth, as the ancient story-tellers used to say, I should call it "a collector's paradise," because I went to it not as a pleasure-seeking hunter with a hunger for "trophies," but as a careful zoological collector seeking nothing but museum specimens. I took my task so seriously that I thought of no animal, and killed no animal, save as a "specimen" to be mounted and to help fill an empty case in some specimen-hungry American museum.

In those days even our now great museums were only in their cradle stages, and many of the smaller ones of to-day had not even been born. Honestly, I believe that a very short train of freight-cars could have hauled all of the foreign "stuffed animals" that all America could have shown in those early days, and that two freight-cars would have held all the mounted skeletons of land animals. In fact, our new museums, of which the Museum of Comparative Zoology at Harvard was then the most vigorous, wanted anything and everything in animal life that was obtainable in India, the Far East and Africa.

Into that awful vortex I joyously sought to throw the whole vertebrate fauna of India and the Far East.

Previous to going to India I had tried my luck as a

collector in Florida, Cuba and South America, and found all those countries horribly disappointing in the amount of wild life they contained. Because there was so much jungle around each animal I had to work my heart out for a very little.

But, oh, India! That was the consolation prize!

The Jumna River was a fine stream for gavials (Gangetic crocodiles) and large birds. The Nilgiri Hills were strong on scenery, but mighty weak in animal life. There, however, I got a line on a mountain range in the south, only 160 miles from the southern point of India, called in English the Animallai Hills. Without standing upon the order of my going I fled down the steep pass from the Nilgiri Hills, and headed south. I went by swift bullock-cart across the red, hot and famine-stricken plains country south of Coimbatore, and with a bang came up against the steep side of a green forest-clad mountain range 2,000 feet high. The climb up to the top of the rock pass was hard but promising; for that green mountain prospect looked mighty good to me.

On the top—behold! The first real "hunters' paradise" of my dreams, and such a one as I never, never expected to see on this earth. (I have found one other since.)

I have read many books describing hunting adventures and scenery, covering nearly all the known hunting-grounds and wild-animal haunts of the world. Since India I have seen some fine hunting-grounds elsewhere; but never have I seen any other hunting-ground so well

stocked with big game, and at the same time so generously surrounded by beautiful forest scenery and stage properties as I found on those Animallai Hills. There I lived for five delightful months. Had I been merely a "hunter," I would have "shot there," for the regulation week or two, taken a fair number of good trophies and gone away with only half the place revealed. As a collector, I built comfortable bamboo huts, and lived in the depths of those forests, literally among the wild beasts, until my work with them was well finished and I had accumulated a fine stock of museum skins and skeletons, and jungle-fever.

My first base camp was made at a spot that my friend Albert Theobald named "Tellicul." It was in the most beautiful bamboo and teak-tree forest that could be imagined, beside a charming little forest river, where a tributary creek ran in. Many herds of big game of several kinds roamed the forest around me. To go out and hunt them was like hunting through a vast mountain park, or an Indiana woods-pasture of fine trees and green grass, richly stocked with game. The weather was warm, but never hot. The air was like that of a palm-house in a botanical garden. The forest was absolutely free from annoying thorns, biting ants and bad bugs. The air bore no flies or gnats, and the only mosquitoes were a few weak little fellows with black-and-white legs, who obligingly knocked off work at sundown, and never buzzed or bit at night!

"Snakes?" No. I never met one; and with all our

looking we never could find one that could be called either "big" or "bad"! It was disgusting.

A very wonderful thing about that forest was its open character, and its freedom from tangled and impenetrable jungle. In places there were plenty of low bushes, but there were miles and miles of bamboo jungle that was positively fascinating—like dream forests. The bamboo is a species of gigantic grass, and there it grew from forty to sixty feet high. The stems grew in close clumps of thirty to forty, bare of green leaves near the ground but sending their stalks aloft in graceful curves, with feathery tops like green ostrich-plumes.

Those clumps grew well apart, in the ample spaces left for them by the grand old teak and blackwood trees, and on the forest floor between them there was nothing but a low growth of forest plants, hardy annuals all, that quickly spring up after each annual forest fire has cleared the ground of dead material.

In a strong wind those bamboo forests rang with creaking and screeching noises made by the long stems rubbing together, and it sounded like wind in the rigging of a thousand old-fashioned wooden ships. The hill people say that sometimes fires are started by the friction of stem against stem, but I never could believe it.

To live in that dream forest was a delight; and the panorama of wild-animal life that in it unrolled day by day was, as I now see it, marvellous. The wonderful feature of the Animallai hunter's paradise was the extraordinary abundance of wild-animal herds of many species,

in forest and jungle sett ng that was enchanting, and also comfortable to man! The elysium was not marred by heat and glare, by ugly plains, by swamps, by repulsive hills, nor by heart-breaking rocks or wait-a-bit thorns. Its human habitants were not plagued by thirst or hunger, by long distances, or by misshapen and ugly trees.

Big game was so abundant, and so unscared by man, that in each day of hunting we were sure of finding something worth while. That condition I never met elsewhere. The largest game animal was the lordly Indian elephant, then found there in herds of 10 to 40 individuals. As to killing, they were carefully protected; but by governmental authority, most graciously granted in Madras, I was enabled to take two specimens. Much more interesting than my hunting experiences with elephants were my observations on their daily lives and thoughts. As if in order to contribute to my amateur studies of the Indian elephant at home, there was a large force of working elephants at work in that forest, getting out teak timber, and once I spent two weeks in their camp.

And once, while I was temporarily absent from my Tellicul camp, a herd of wild elephants wandered to it, and just for fun pulled down my bamboo hut.

One day my hunting-gang of naked and tousel-headed hillmen (Mulcers) had a thrilling elephant experience of a rare kind; and I was among those present. We were hunting near the boundary of a native state called Cochin, a territory in which I had no right to hunt ele-

phants, much less to kill one. I had a good map, and I knew the boundary well, but up to that time we never had passed the time o' day with any of the Cochin Rajah's forest police.

We found a small herd of elephants containing a good, big tusker such as I surely needed at that time. At twenty yards I fired at him to hit his brain, knocked him to his knees, and was feeling that he was just the same as skinned and skeletonized—when to my amazement he struggled to his feet and shuffled away after the other members of the herd.

Horrified by the idea of having him get away wounded we rushed after him, and in quick time the fleeing herd led us across that awful Cochin boundary. The men remarked it, doubtfully, but I gave the word for progress, and on we ran, as hard as we could go. I knew that according to the articles of war we were trespassing, but underneath our excitement was a wild hope that we could chase those elephants back into our own legitimate hunting-ground.

The chase led us up the side of a high ridge, and it made our tongues hang out. Momentarily we expected to overhaul our tusker, finish him and take desperate chances on getting caught in the act.

Suddenly, like a clap of thunder from a clear sky, we heard just ahead of us a wild yell, coming straight down the trail. If the yeller had kept still we would have rushed into his arms.

The men stopped, paralyzed, and looked at me in terror.

Another yell, louder and nearer—very near.

"Shavoogan!" hissed my head tracker. "Shavoogan!" (Forest policemen.)

Instantly my men wheeled about and broke away down that steep hillside as if ten tigers were after them. Having nothing else to do, and fearful that they might get lost, I ran after them. I never again saw a hunting-gang run so fast as that one did. Had there been time to spare I could have laughed; but the case was too serious.

We never stopped, nor even hesitated, until we crossed that infernal boundary, and once more felt our home grounds under our feet. When the men halted to take breath, I was pleased to find that they had a sense of humor. We laughed heartily, at each other and ourselves. In fact we roared; but we never again saw that elephant, nor heard aught of him. The wonderful open-work cells of bone surrounding his brain easily saved his life—because I missed his miserable little brain—and aside from a bad headache for a few days he was otherwise as good as new.

After the elephant, the next wild animal in size and general importance was the gaur, or Indian bison—also known in the Malay countries farther east as the sladang. In actual bulk this noble animal slightly surpasses our American bison, and it is altogether a grand beast. In that warm climate it has little use for hair, and so Nature has given it an extremely short supply. The best of it is not over two inches in length, and all of it is coarse and

thin. The body is chocolate-brown in color, but the legs below the body are white, as if the owner had recently walked through a river of white lead. The horns are quite large, and all white save their black tips.

Of female and young gaur we found many, and let the most of them go in peace. To kill a really old male gaur is fully as much of a task as it looks; and to preserve his huge skin and skeleton is still more so. We took there six animals, and they all went into museum cases.

There were three very interesting deer species. The largest was the big Indian sambar, the largest round-horned deer after those in the group of wapiti, or "elk." In saying this I think of all the European red deer as belonging to the wapiti group. The sambar of the Animallais did not go in bands, and they were not numerous. I nearly lost out with that species, for I did not secure even one with which I was satisfied.

The axis, or spotted deer, is in my estimation the most beautiful member of the Deer Family of the world. It is beautiful in its lines, in its colors and its statuesque poses. Its antlers are perfectly satisfactory. We found it frequently, in herds of 15 or 20, usually in open grassy glades in the bamboo forest. And, dear me! How lovely they were! Even though the museums of America had none, I hated to kill one; and I did kill very few.

Did you ever in hunting specimens strangely fail to hit a mark that it seemed to you impossible to miss? There are aberrations of rifles, just the same as aberrations of mind. Take this shot as an illustration:

From an old engraving.

A TIGER EPISODE IN A HUNTERS' PARADISE.

Once I successfully stalked a fine buck axis deer by creeping up close to it under cover of a prostrate tree-trunk. With my tracker close behind me I reached a point within fifty yards of my game, cautiously peered up over the log, took steady aim and fired. Instead of falling at the shot the deer calmly ran away!

My men were astounded, and made exclamations that registered degrees of amazement. As for myself, I was almost paralyzed with conflicting emotions—surprise, disgust, rage and battered pride; but to this day the failure of that shot remains an insoluble mystery. But in the hunting-field, I hear that other men have had similar experiences.

The little muntjac, or barking-deer, so named because its barking cry suggests the yap of a fox, was rare, and always solitary. Had they not been shrewd at hiding—usually beside prostrate tree-trunks—their large enemies easily would have destroyed them. They were very small, very weak, tan-colored as to coat, and their funny little five-inch horns were set up on tall, slender pedestals of solid bone, covered with skin and hair. The flesh of the muntjac is to sambar-deer venison as spring chicken is to beefsteak.

The only other hoofed animal was the wild hog, of which I had the good luck to shoot the best male specimen out of a "sounder"—which is Indian English for *drove*.

I looked long for bears, but found only one full-grown bear and two small cubs, of the long-lipped or sloth-bear

species. We surprised each other by travelling on the same rainy day in the same forest at the same time, and toward the same point. Had we all been just a trifle more stupid than we really were, we would have bumped into one another, all six of us. As it was, we managed to see them first, and after some frightfully poor work on my part we collected the large bear. I should have secured all three; but that was my dull day.

We did find one royal Bengal tiger; and he was quite worthy to represent his species.

There were tigers in the Animallai forest, but they were all game-killers, they never killed cattle, and the forest was so vast and continuous that no such thing as a regular "tiger hunt" was possible. There was nothing to do but go hunting generally, and trust to luck for an accidental meeting.

But, as if to pay me for some of my jungle-fever, Fate gave me a streak of good luck with a fine tiger at the end of it. True enough, if we had been timid, or foolish, or a really bad shot, we would have lost out; but we kept our end up, and Fortune did the rest.

We were not hunting tigers at all. I was so sick and miserable from fever that I could do little more than walk, and I was out to kill a deer for my hungry camp. I had lost one chance to stalk a herd of deer, because I was so ill; but when we came to the sandy bed of a nearly dry forest brook, and found in the smooth sand the fresh footprints of an enormous tiger, I got well immediately! Of course we at once set out, like good

sports, to follow those footprints just as far as we could make them out—and at the end of just about a mile of beautiful bamboo forest *we actually overtook that tiger!*

As I had always hoped and prayed might be my case in any mix-up with a tiger, *we saw him first!* And surely I needed that advantage; because my rifle was a little thing far too small for any such work as that. Its caliber was only 40, its powder was black and weak, and Captain Ross had solemnly warned me not to do it!

The distance was just thirty yards. As he looked at me and glared his first glare, my first bullet took him in the iris of his left eye; and about ten seconds later the second one broke his neck and laid him low.

For about fifteen years he held the record for length measured before skinning (9 feet 8½ inches) and also for weight (495 pounds).

If interested, you can find him to-day, fully mounted, in the Museum of Cornell University; but the mounting now is "old-fashioned"; so "*don't view it with a cricket's eye.*"

XVIII

THE GREAT RED APE OF BORNEO

MOST sincerely do I wish that I could bring before all intelligent boys and girls just one big, full-grown male specimen of the great red orang-utan, the wonder ape of Borneo. If I could do so the sight of him never would be forgotten by any beholder.

For the scenario, we would need the warm, moist air of the great equatorial island, charged with strange sweet odors of palms, orchids, pepper-vines and pitcher-plants. The jungle background should be strung and festooned with long, hanging vines and rattans, and garnished with air plants clinging to the trees. Some of the trees should have great flat slabs of living wood, as spur roots. In the dark shadows of the forest floor there should be visible a group of black-haired, pleasant-faced, brown-skinned Dyaks with few clothes save the bark loin cloth. They should be armed with spears and wonderfully sharp swords, all of their own making.

But the great orang-utan, or "jungle man," is the all-important thing; and beside it all the other animals of Borneo, great and small, take lower places.

Fortune gives to very few white men the opportunity to see the great orang-utan as a close-up at home, or to see anywhere even one living full-grown male specimen. In the zoological gardens and parks of the world, what do we see?

The ninety-and-nine out of every hundred are either roly-poly babies, or young animals under five years of age. In all my life I have seen in captivity only three fully adult orangs. One was a big male in Singapore, and the other two were in our own Zoological Park—a male and a female with a baby in her arms.

But Fortune was kind to me in a certain year of the Past, and gave me my chance to see orang-utans of all ages and sizes in their own Bornean home. It was an orgy of red satyr apes. Though I should live a thousand years I never could forget the wonder and the awe that thrilled my soul when I saw as a "close-up," and took in my eager hands, my first big male orang with fully expanded cheeks.

Up to that time I never had seen such an astounding animal, not even in the best museums of Europe, not even in pictures. When I shot that red-haired monster, when it fell into the water of the overflowed forest with a tremendous splash, quite close to my boat; when my Malays and I eagerly reached forth and seized it, and with a great effort hauled the king of all the orangs into our boat, it was an astounding revelation. Most vividly do I remember the thought that leaped in my mind:

"This great red-haired monster is not of this earth! He looks like a satyr, or a gnome from another world! Right well was he named 'satyrus,' the Satyr Ape!"

Believe me, in its face, form and appearance the largest and ugliest gorilla of all Africa, aye, even of Mount Mikeno, has "nothing on" an old he-one of the orang-

utans with the expanded face. The countenance of the chimpanzee is tame and commonplace in comparison.

And what, I hear you ask, is it that is so wonderful about an old male orang-utan? Have patience, and I will try to tell you.

The first thing—and also the last thing—that rivets your attention, and thrills you till your nerves tingle like the wires of a hand-swept harp, is that huge, *black* and wholly unearthly face. Is there anything human about it? No! A thousand times no. The ugliest gargoyle is tame in comparison.

The total size of the head and face is enormous. The muzzle is massive, the lips and mouth are very wide and the gape of the mouth is vast. The teeth are big, broad and dangerous. The canine teeth are like those of a black bear. No wonder these awful creatures bite off each other's fingers and toes as if they were stalks of celery. The bases of all the teeth are stained jet-black by vegetable juices; and this adds to the uncanny appearance of that awful cavern of a mouth.

The nose is merely a flat disk in the top of the muzzle with two holes through the centre of it. The eyes are small, *far* too small for so large an animal, dark chestnut-brown, and except in young specimens they are unlike human eyes. The eyes of the young orangs are much larger in proportion, liquid brown and have human qualities in their appeal.

The really astounding feature of the old male orang's face is the expanded cheeks, called by naturalists "cheek

From a drawing by Olive Earle.

A GIANT MALE ORANG-UTAN ON HIS TREE-TOP NEST.

Such expanded cheeks are not found on any other animal.

callosities." At the outer side the skin of each cheek is expanded into a huge *flat* disk covered with naked skin, with a thick roll-over at the edge. The front of this strange and elsewhere unknown development is naked, flat and smooth, but so firm in structure that its shape is quite permanent.

These twin expansions of the cheeks make the face so wide that often it has a total width of 12 or 13 inches! As already stated, no other living animal possesses any feature at all like this.

After the head and face, you notice that this huge gnome of the jungle is partly covered—on legs, arms, abdomen and back—with long, coarse and straight brick-red hair. On the back of the arms and thighs, and on the sides and shoulder-blades of old males, it sometimes reaches a length of from *twelve to fifteen inches*, and when worn full-length it imparts to an animal a very picturesque appearance. The chest, back and abdomen are enormous, and in them great weight is centred. Across the chest hangs a great flat bag of loose skin which sometimes the wearer can inflate at will, with air, and deflate.

Animal measurements in figures do not always convey clear impressions, but they are at least helpful to the understanding.

My largest male orang-utan measurements were: 4 feet 6 inches in standing height from heel-bottom to crown; 42 inches around the chest and 27½ inches around the neck. The largest arm was 12½ inches in circumference, the thigh measured 19 inches. The weight of the

largest male animal I conservatively estimated at 250 pounds. (Little enough!)

The skin of an orang is dark chocolate-brown, but the face of an old male is black. Two had faces 13½ inches across.

Next you will examine the legs and arms, and their terminal facilities. The outstretched arms of one of my big male orangs measured only half an inch less than *eight feet* between the tips of the middle fingers! My old notebook says that the hands of two were 11½ inches long by 3½ inches wide. The foot was 2 inches longer than the hand, and the toes were really long *fingers!* Through many generations of swinging through the corridors of Time, and carrying that great overload of useless body, the muscles of the shoulders, the biceps and the forearm were heavily developed—like those of a working blacksmith. On the spot I recorded the fact that "those huge hands and feet seem to have been fashioned to enable their owner to grasp all creation, and hold on."

The legs were short and thick, and the hand-like foot, with its long and independent toes, was another member of that strange wild-animal composition that was a long, long way from the feet of other apes, and from those of men. On the ground the orang walks with real difficulty. Its hand-like feet are ill fitted for walking, and its gait is like that of a man on crutches. The fingers and toes *bend inward*, and the animal is compelled to walk upon them. The foot is very far from resembling that of a man, even the most primitive type. Wild orangs very,

very rarely descend to the earth, but in the level forest plain near the seacoast, the orang blithely swings through his tree-tops, rarely walking upon the limbs.

When this animal seeks to cross from one tree-top to another, he never leaps, as monkeys and gibbons do; because he is too heavy, and dares not risk fatal falls. He climbs far out at the best point of contact, reaches a long arm toward the neighboring tree, sweeps together into his powerful grasp as many branch ends as he can gather, grips them very firmly, then carefully swings himself across the chasm.

The arms and hands of a big male orang are causes for wonder. But, after all, they are just what we should expect wise old Mother Nature would provide to enable a 250-pound man-ape to live continuously in the tree-tops. The arm is very long and strongly muscled—just as it should be—and the big, bony hand is all skin, bone and tough sinews, without an ounce of fat or of surplus flesh. I quickly noticed that even when an orang is dead the hands and feet close automatically, and remain closed so tightly that you cannot by any means skin a hand without first cutting all the flexor tendons in the palm, to break the combination and loosen up the clenched fingers. This tension is Nature's way of enabling an orang to sleep on its big nest of boughs in a sapling top without falling out of bed. The hands and feet automatically grasp the surrounding branches, and thus the swaying sleeper is quite safe.

The orang-utans of the Sarawak coast do not live in

big, tall trees like our adult oaks, hickories, poplars and maples. Such trees would involve them in too much hard climbing. I always found them in trees about 50 feet high, like our "second-growth" timber, and their favorite travelling height was about thirty or forty feet above the ground. In Sarawak they loved to hang out over flooded forests, wherein no enemy could get near them without a sampan, nor chase them without either wading or swimming. Once when I dropped overboard from my Malay dugout, rifle in hand, instead of touching bottom in water only waist deep, I went under out of sight in a basin of unknown depth. However, I managed to keep both my head and my rifle, either of which would have been useless without the other.

A big jungle orang-utan has a queer wild-beast odor that you never forget. It is not really so very disagreeable, but it is something entirely new to you, and it seems to fit that fearful and wonderful beast. It is possible for a shrewd cook to palm off well-cooked orang steaks for the lean and neutral beef of the tropics, but even in Borneo no native ever knowingly consents to eat orang flesh.

I am sorry to say that, in comparison with the old heones, the females are much smaller and less interesting, because they totally lack the wonderful expanded cheeks of the grandfathers of the tribe.

The nest-building habit of the orang-utan is most interesting. The "mias"—as the natives call them—are persistent nest-builders, and their nest structures in the

low tree-tops along river margins effectually betray the presence of their makers. Each nest is placed squarely in the top of a stout sapling or a small tree, well poised over the tree's centre of gravity to avoid lop-sided development. The orang who desires a nest and a bed picks out his tree, climbs to its top, and quickly breaks off and piles crosswise in the topmost crotch enough leafy branches to make a good wide bed.

In ten minutes he is ready to scramble upon his green-branch platform. As he tests it he adds the last touches that he deems necessary, then stretches himself flat upon his back upon it all. His four hands reach out in four directions, grasp the strongest branches within reach and hold on as if clamped there. Thus lying, tropic mosquitoes and tropic rains equally defied, and swaying gently to and fro in Mother Nature's own cool cradle, he resigns himself to the sleep of the full stomach, the quiet mind and the clear conscience. And there will we leave him, in what Mr. William Beebe calls "jungle peace."

XIX

THE AMAZING DYAKS OF BORNEO

"A taste of an India curry, the smell of a sandal-wood fan,
And lo! I am back in my jungle, a buoyant and fresh young man.
Puck's girdle is beat to a frazzle as out to the East I go,
Round half the world in a second, to wonderful Borneo."

—*Back to Borneo.*

IN these awful days of bandits, murderers and thieves of a thousand kinds, I fear that by many persons this sketch of the wild jungle-reared Dyaks of northwest Borneo will be doubted. In my mind I hear a strong man's voice interrupting, and saying kindly but firmly:

"Oh, come now! You surely cannot expect people to believe that you ever saw 20,000 wild jungle people who can turn out *no* thieves nor murderers!"

But hold! All the wonders of the world do not lie around our own doors. And even in Singapore a German who had left home to see the Far East once broke out in noisy ridicule because I casually mentioned that I had collected fruit-bats whose wings spread 48 inches across.

The people who read American newspapers may well be surprised by what I now am to tell of certain unspoiled human beings that I met in their tropic jungle home, and lived with for three very interesting months.

In civilization every mixed company of one hundred persons contains at least five potential thieves, by which

I mean people who will steal if they think they can take the goods and escape detection.

Once upon a time the romance of the great, mysterious tropical island of Borneo—crossed by the equator but never yet really crossed from side to side by man—entered into my young soul and took possession of it. Whenever I thought of "The home of the orang and the Dyak," it thrilled through me like a current of electricity. By day and by night I dreamed of those "wild" men and wild beasts, and at last I resolved to go there and see about them. That all-prevailing mantle of evergreen forest challenged me to penetrate its leafy depths, and while there try to learn something about Man and Nature.

When we landed on the rank and dank shore of the mighty Sadong River, we found ts jungles reeking with vegetable and animal life. The air was deliciously warm, moist, and laden with agreeable woodsy odors. The useful nipa palm fringed the shore, and behind it in the level coastal forest the thorns of the far-reaching Livistona palm and the climbing rattan warned you to beware. Farther back, where the always green hills of the interior rose from the coastal plain, the forest was in most places delightfully open, and the hunter of "museum specimens" could wander free and far.

We went into all kinds of places, from tiny forest creeks and dark swamps to rocky mountains both good and bad. Do not rashly attempt to climb a sizable mountain in Borneo. If that is not the most exhausting of all

mountaineering, then where will worse be found? It is because the mountains are so steep, so fearfully covered with rocks and forest, and the heat and rains are so trying to the climber.

We found the wonderful orang-utan at home; and many museums now can bear testimony to our industry and success. We encountered the gray gibbon in the hill forests; and he so nearly bested us that we mention him with respect and reserve. We found the spectacular proboscis monkey, practically never seen in captivity, and we drew pictures of his wonderful nose that (for the first time?) were absolutely true to life. The sambar deer and the little muntjac deer we left alone, but the Dyaks and Malays brought us specimens of the tiny mouse-deer, the size of a rabbit, until we threw up our hands and cried "enough!"

In such a garden-spot of Life as that was, we looked with interest to see what manner of men Mother Nature has fashioned and placed there. Would they be ignorant, cruel, stupid and low in the scale of humanity like some others who could be named? If so, then would the romantic Spell of Borneo be seriously cracked, if not broken. With a fair show through ages of work, and with good raw material, Nature should produce good trees, animals and men. And what is the result in that garden of the sun, as we now find it expressed in terms of men and women?

Physically, the Dyaks of northwest Borneo (Sarawak) are fine, upstanding men, and as nearly perfect as can

be found to-day anywhere among the primitive and unspoiled tribes of wild men. They reminded us of well-conditioned wild animals—muscular but not fat, agile and enduring rather than heavy and extra strong. As befits life in thick jungles, they are a little below the medium size of native Americans. They can climb better than they can lift heavy weights; and even the tallest trees have no terrors for them.

With native iron ore and their rather crude steel tools they are deft-handed and skilful in making and carving. An American lumber-jack would feel highly insulted if one were to hand him a tiny little reversible axe-adze, such as the Dyaks use, ask him to chop down a tree 3 feet in diameter and from its trunk make a fine serviceable canoe. But to a Sea Dyak that would be regarded merely as an incident in the day's work.

The faces of the Dyak men and women are comely, pleasing and utterly lacking in the exaggerated characters that we universally dislike. As they stand before you, the men clad only in a loin-cloth of beaten bark-cloth that falls down apronwise in front, the women only in the sarong (petticoat) from the waist to a point briefly below the knees, you see that they are smooth-skinned and fine-grained. The women are the color of old ivory, the men a light coffee-brown, and none of them are black. A Dyak lady may on state occasions wear a bright-colored jacket, but it is much more for show than for use. The unclothed breast and arms are nothing more to remark upon or to stare at than is the bamboo water-

pail that the Dyak woman carries; and that is all there is to say about that.

Mentally the Dyaks are certainly entitled to a high place in the ranks of the primitive races of the earth. The way they have worked out the logic of Life is nothing less than wonderful. The nicety with which their lives fit in with their wild surroundings is admirable. What they cannot draw from the wild jungles for their subsistence they cheerfully secure by cultivating the soil. They have wisely refrained from indulging a lot of "civilized" wants which they can gratify only by extra hard toil. They have kept their wants down to a simple basis, and there is no mad rush for fine (and useless) clothes, money-eating jewelry and injurious drinks and foods. The Dyaks know how to be wisely conservative, let well enough alone and avoid all the intemperate extravagances of civilized life.

But it is in their moral standards that the Dyaks are most wonderful. By their own primitive reasoning, but also aided in the matter of head-hunting by the first Rajah Brooke, they have reached the universal conclusion that it pays to be good, and to give up head-hunting forever. They have learned that peace and the observance of the rights of others promote long life, happiness and prosperity.

As a result of this jungle logic, the Dyaks do not steal, they do not lie, they are not cruel nor abusive to their children, their wives, or to elderly people. Moreover, through days and weeks of life with the Sea Dyaks I

THE AMAZING DYAKS OF BORNEO.

The Dyaks of northwest Borneo are, so we believe, both intellectually and morally, the highest of all the many tribes and races of primitive, or so-called "savage" men. Their philosophy of life registers higher than ours.

have seen that from fifteen to twenty families can live in a row of rooms in a "long house" without any quarrelling, backbiting, tale-bearing or visible jealousy. As for murder, that crime is almost unknown in Sarawak; and a lynching would be regarded with unspeakable horror.

In Dyakland I locked up nothing; and I lost by theft not so much as a nail or a scrap of paper. Even the empty shells from my gun, that I threw away, were brought to me to have their proposed new ownership approved. Such respect for the rights of property was astounding.

The Dyaks have no religion; and in my day there were no missionaries among them. They have no ideas regarding heaven or a future life. So far as I could learn they never had founded either a heaven or a bad place.

About fifty years ago there was fighting and headhunting among the Dyaks of Sarawak Territory, but when Sir James Brooke, an English gentleman, acquired the country from a Malay sultan and became the Rajah of Sarawak, on taking the reins of government, with a clear title to the Territory, he quickly reasoned the Dyaks out of all further desire for that pastime, and stopped it forever.

In what I have said above I have written only of what was visible before the rise of the rubber craze, and I wish to be absolved for every bad thing that has happened unto or by the Dyaks since that time. With the rise in the price of war-time rubber to forty or fifty cents per pound, a vast rubber-planting industry developed in

the Far East. I have been told that developments in rubber plantations have made a great change in the basis of the native coast tribes of Malayana since automobile tires sent rubber up to its peak prices. I am not now thinking of Sarawak's wonderful exhibit in primitive human development as it may be to-day, but as it was before it was warped out of shape by modern commerce and industry. I think, however, that this new industry has not greatly affected the tribes of Hill Dyaks.

In these days of after-the-war turmoil, unrest and demands for "more," all along the line, it is a pleasure to think of people who are moral, serene and happy, and who are not torn by diversions nor consumed by the fires of ambition, jealousy or unfulfilled desire. I believe it must be true that every primitive people have some virtues, and that some have a really great number of them. Proud men and women do not relish the idea of learning industry from the ant, the virtue of peace from the wild animals and moral philosophy from the Dyaks; but blessed is he who maintains an open mind, reasons from cause to effect and is not too proud occasionally to learn virtue from humble examples.

XX

THE GREAT MOUNTAIN GORILLA OF EAST AFRICA

"Study *me:* for I am fearfully and wonderfully made!"

AT a dramatically interesting spot in the highest and wildest portion of East Africa, surrounded by extinct volcanoes, steep mountains and beautiful lakes, there dwells an eastern outpost colony of the most remarkable gorillas in Africa. They were discovered and brought into notice in 1902 by Oscar Von Beringe, after whom this species was officially named. Since that time several gorilla collectors have visited that region for museum specimens, and some astounding gorilla citizens have been taken.

Take a good map of Africa, and in the country of the great eastern lakes find Lake Tanganyika. From its most northern point go on due north until your pencil comes to 2° south latitude, only 120 miles from the equator. There, at an elevation of 5,000 feet, you will find a little lake called Kivu, the highest of all African lakes. It is opposite the southern end of Lake Victoria, half-way between Tanganyika and Lake Edward, and in places it is 2,000 feet deep! In 1912 the northern end of little Lake Kivu was the theatre of a tremendous volcanic outburst that poured a river of red-hot lava into the north end of the lake until its waters there became hot!

Immediately northward of the northern end of Lake Kivu there is to be found a range of steep forest-clad mountains that march off due eastward for about fifty miles. There are a dozen prominent peaks, to which only queer native names ever have been given. On them thick bamboo forests abound. About 100 gorillas own, in fee simple, half a dozen of those mountains, and natives never go there alone to hunt them. The three peaks nearest the northeastern corner of the lake are called Mikeno, Karisimbi and Visoki. That gorilla colony seems to be one of the most easterly outposts of the great gorilla empire of Equatorial Africa. It is known that gorillas inhabit the forests from Katana, on the western shore of the lake, westward for at least a hundred miles, but it would be unsafe to guess that the line of gorilla population is practically unbroken for 700 miles more, or that it reaches the eastern border of the better-known gorilla land of West Africa. Mr. Barns says that in the Aruwimi and Ituri Valleys he found no gorillas.

Meanwhile, at Lulenga, in the forest a few miles due north of Mount Mikeno, and most conveniently located for gorilla-hunters, is a well-appointed Catholic mission station of the White Fathers. This hospitable base renders the southern approach to the Kivu gorilla country so easy and so safe that a child can use it. In 1922 little five-year-old Alice Bradley, of Chicago, was comfortably conducted to that point and out again by her parents, a nurse and Mr. Carl E. Akeley.

We are particularly interested in the Lake Kivu

gorillas, because of their unusual habits and characters. The West African gorillas are all right in their way, and also wonderful, but in some respects the mountain giants of East Africa seem to go beyond them. For myself, I never have personally known any live gorillas save walking delegates from the French Congo country, West Africa. However, Mr. T. Alexander Barns, a well-qualified English collecting naturalist and explorer; Mrs. Mary Hastings Bradley, a Chicago novelist, and Mr. Akeley have given to the world in their three books such admirable accounts of the Kivu gorillas and their country that it is not wholly necessary for me to go there and see for myself. From those books, and the photographs kindly furnished me by Mr. Barns, I am quite able to write out my impressions. In fact, I have been so astounded by Mr. Barns's story and photographs that I must pass along the main facts or run the risk of heart-failure.

In the first place, the Kivu gorillas differ widely in their mode of life from the Du Chaillu gorillas of the west, to which we have grown accustomed. The latter inhabit the low, comparatively level and densely jungled tropical forests of the West African coast, north and south of the Equator. The highest elevation that I have seen recorded for them was 2,400 feet, on the top of a rounded mountain ridge rather unlike a real mountain. I think that in West Africa few gorillas ever have been seen or taken by white men save in the river valleys of the coastal plains.

On the other hand, the Kivu gorillas inhabit the steep and slippery sides of big mountains, where skidding is only too easy, and whereon a killed gorilla sometimes rolls and plunges down in a way that is appalling. Bamboo jungle is abundant and thick. Judging by the pictures the tree growth seems to be thin, the trees are low, small and open as to their tops. They look like the live oaks of the South, only smaller. The gorillas climb into them, apparently just for fun, and not for the real business of hiding or fleeing from enemies, or getting on in the world. The limbs are too small to serve the serious needs of big and enormously heavy gorillas. When a gorilla is basking or loafing about on the horizontal limbs of a tree, and becomes alarmed by the appearance of danger, he promptly swings to the ground and makes off on all fours, for all he is worth, or else leaps off the mountainside into the top of the nearest bamboo forest.

The gorilla does not rashly rush into mortal danger by attacking men unprovoked. He is not interested in "open seasons" and "bag limits" on men. He runs, for self-preservation; and if he is a big and old he-one, with a silvery-gray back, even the white hunter must hustle hard in order to get a fair shot at him. In doing so, the said hunter must mind his step thoroughly, to sight his game first and to keep from slipping on the muddy trail and skidding down the mountainside.

Our second concern is with the astounding physical character of the adult male Kivu mountain gorilla. The standing height from heel to crown of the huge old male

killed by Mr. Barns on September 18, 1920, and pictured herein, was 6 feet 3¾ inches. The chest measurement was 61 inches, the "span of arms" 90 inches, and the circumference of the forearm was 16½ inches. The animal was equal to "two large men," but its estimated weight of 450 pounds seems to have been somewhat too high.

The animal was 9½ inches taller than my largest orang-utan, 19 inches larger around the chest, but 6½ inches shorter in span of arms and hands. I estimated the weight of my big orang-utan at 250 pounds, which I still think was very near the mark. Mr. Barns and I are both of us entitled to censure for not having been provided with jungle scales with which to ascertain weights accurately!

Naturally, the most remarkable thing about Mr. Barns's huge male gorilla is its physical aspect. Before that gruesome monster I stand wonder-struck; and I say this after having known, in pictures and in words, some of the greatest gorillas that ever came out of West Africa. Of the latter, I long have regarded Mr. Paschen's specimen as the finest prize; and for nineteen years a fine water-color picture of it, made by J. Carter Beard from an excellent photograph, has hung in my office. I mention this fact to inform the reader that to me the gorilla is not by any means a new subject.

But there are gorillas and gorillas. Fortunately for all admirers of the wonderful works of Nature, Mr. Barns is a skilful and shrewd photographer. Look upon his handiwork as here exhibited. Not only did he

kill the most wonderful gorilla of which the English-speaking world now knows, but he also fixed it up so that he secured the most astounding photographs ever made of a dead gorilla for comparison with a man. For twenty years the Paschen photograph held first place, but Mr. Barns has surpassed it. No other gorilla picture ever seen by me so dramatically portrays the vast gulf that separates the fully adult male gorilla from man.

The native man beside the gorilla in the picture was 5 feet 10 inches tall—the height of Lord Chesterfield's ideal gentleman—but beside the full-length gorilla he looks like a near-pigmy. The man was fairly well fed and well muscled, but his weight was certainly 200 pounds less than that of the gorilla. The breast of the gorilla looks twice the width of the man's chest. The body, arms, legs, hands and feet of the gorilla are all gigantic; and no other word fitly describes them. We now believe that Mr. Barns's 450-pound estimate of this ape's weight is over the actual mark only because Mr. Carl E. Akeley's largest gorilla of that same species was actually weighed, and its weight was only 360 pounds.

We are awed by the body and limbs of this jungle monster, but the head is the most astounding feature of it all. On it I find a feature that I never before have seen in a gorilla, living or dead, nor in a gorilla picture; and again we have reason to salute the skill and judgment of Mr. Barns as a photographer.

The huge face is gnome-like and uncanny; but the muzzle is very narrow where it joins the orbits, and for

a gorilla the nose is remarkably *low!* But the face is not the only strange feature. Look at the great bonnet-like expansion on the rearward half of the cranium! Without the photograph we could not be made to see it, nor could we believe it. Mr. Barns assured me that the skin on the top of that strange crest was "two inches thick," and also that "the teeth of that animal were worn down to the gums, and I believe that he was a hundred years old!"

It appears that this remarkable cranial hump was formed of flesh, skin and hair only, for there is no corresponding elevation in the skull. I have ascertained, however, that the skull is much longer in proportion than the skull of the West African gorilla.

I think that, like the wonderfully expanded cheeks of adult male orang-utans of large size, the hump on this gorilla's head is wholly of a sexual character, found only on the heads of old males. The females seem to be without it, and the West African gorillas have shown nothing like it. The nose of the Kivu gorilla is remarkable in being almost as flat as the nose of the chimpanzee. This feature is so pronounced that it may well be taken as a landmark of the eastern species.

The habits of the Kivu gorilla are thus described by Mr. Barns in his book, *The Wonderland of the Eastern Congo* (Putnam, 1923).

"Like the Gaboon gorilla, the eastern gorilla is not a tree-dweller. It lives its life upon the ground, on all fours, and apparently climbs into the low trees of its

home country for diversion and change rather than from necessity. It sleeps upon the ground. It is wary, suspicious and always on the lookout for its arch enemy, man. It feeds on vegetable food only, and is fond of the tender shoots of the bamboo.

"Socially, the Kivu gorilla is by no means a creature of solitary habits. Usually several individuals are found together. Just as in the French West African territory, they raid the gardens and plantations of the natives in quest of easy food, and sometimes they clash with inconsiderate persons who object to having the fruits of their labors destroyed by big, black bandits who neither toil nor spin. Mr. R. L. Garner said that around Fernan Vaz the French-Congo gorillas always raided the banana plantations under the cover of darkness, and were very careful to depart before dawn.

"Morally and physically, even the big Kivu gorillas are not so aggressive nor so savage that they wantonly attack men. When attacked by men in their own mountain jungles, they run at the first sign of their one great and deadly enemy. And where is the unwounded wild animal that does not? It is the same story all over the world. When it can run from man, the wild animal gladly does so. But wound and corner a bear, a lion, tiger, buffalo, orang-utan, chimpanzee or gorilla, and it will fight to the utmost limit of its powers. We know that in West Africa, and also in the Lake Kivu country, a few native hunters have been killed by gorillas, but always—so far as we have heard—it has been in self-defense."

THE WONDERFUL EAST AFRICAN MOUNTAIN GORILLA.

The collector and photographer, Mr. W. Alexander Barns, English naturalist, said, "I believe this animal was a hundred years old." Standing height, 6 feet 4½ inches.

In his remarkably interesting book, named above, Mr. Barns has gorilla chapters of great interest and value. I have been amazed by the information that the Kivu gorillas love bamboo forests, both for the food that they furnish and the means of escape that they afford. Now in India very, very few are the wild animals that try to climb about in the tops of bamboo forests; because there the going is about the worst ever. I never but once saw monkeys tackle them. But just read this from Mr. Barns's book:

"Non-arboreal in habit, this monster ape seldom climbs trees, his hands, but especially his feet, not being formed for this purpose. He can, however, walk over—a curious feat—a bamboo forest as if it were an aerial meadow. This effect is given when the hunter looks out from some high vantage point across a flat sea of waving bamboo tops in search of his quarry, and, if he is lucky, sees in it bobbing black heads and huge arms stretching out amidst the greenery.

"The shooting was always at close quarters, from 6 to 15 yards' range, the animals usually feeding squatting upon the ground. On occasions, however, as occurred to me more than once, an old male would take a running jump when suspicious of danger, off the steep hillside on which they were always found, and, landing on the nearest bamboo, would swing himself, like an acrobat, from stem to stem in a wonderful way, eventually dropping to the ground—at the end of his impetus, so to speak—as suddenly as he had appeared.

One I shot this way—a lucky snap through the intervening bamboo." (*Across the Great Craterland to the Congo.*)

Now, in view of the great weight of the gorilla, its short fingers and toes and the difficult character of the bamboo forests in which I once lived for four months (in India), the above has amazed me nearly as much as if some one had told me of buffaloes leaping into the top of a bamboo jungle.

Concerning the food and sleeping habits of the East African gorilla Mr. Barns records the following personal observations:

"As regards his food, the gorilla is very conservative, and never so happy as when in his favorite haunt of a forest of bamboos munching the succulent ground shoots [of bamboo], or climbing over the bamboo stems, upon which he is in the habit of making a platform to take a sun-bath. Speaking from a special knowledge of the eastern Congo gorilla, it may be said that its food consists, apart from bamboo shoots, entirely of herbage —docks, sorrels, hemlocks, etc.—though honey may be part of the menu. He does not grub for roots, neither does he eat fruit as a general rule.

"In the densely forested mountains of the equatorial forests, rain-storms are almost of daily occurrence, so that unless sleeping quarters are selected with some care, the gorilla finds himself lying in a puddle from the water draining off his thick coat of fur. Thus it is we find this very human animal, if there is no hollow nor overhanging

trees handy, either scraping a hole for himself which he lines with ferns or twigs, and over which he sits, or forming a similar 'nest' in the middle of a clump of bamboo, so that in either case he will not be sleeping in a puddle.

"Neither their sense of smell, their hearing, nor their sight seems strongly developed. As regards longevity, gorillas, on account of their life free from molestation, famine or disease, and also judging by the worn teeth of one animal I secured, live, in my opinion, to a much greater age than man." They roar when excited, and very frequently persistently beat their chests with their hands; but practically never do they make unprovoked attacks upon men. With all their stock of strength and teeth, they flee from men as precipitately as scared rabbits; which shows that they are wise to the fact that, going or coming, armed or unarmed, man is a dangerous animal.

The fighting strength of a full-grown gorilla always is a subject for speculation. As a guessing proposition, I guess that the strength of a big male gorilla (with a muzzle on) is equal to the strength of three strong men; but I am quite sure that no three men, of any race, could make against the gorilla a successful battle without real weapons in their hands. I feel sure, however, that even though fearfully strong a big old male gorilla is a clumsy and slow-moving animal, and unable to exhibit the marvellous fighting combination of agility, quickness and strength that is found in a full-grown chimpanzee. In a fight without the use of teeth I would back a big gorilla

against three men, but I would back a big chimpanzee (like our "Boma") against any average-sized gorilla, or four men.

I think that the most thrilling and awful fight that could be staged in the wild-animal world would be one between a heavy-weight chimpanzee and a full-grown silvertip grizzly bear. In such an event, which would win? For one item, I think that the awful yells of the battling ape would considerably shake the morale of Old Ephraim, and might easily pave the way to his undoing.

No! Decidedly, I would *not* like to see such a fight! And to promote one would be the next thing to murder.

XXI

A WILD-ANIMAL PIGMY FROM AFRICA: THE PIGMY HIPPOPOTAMUS

THERE is a region of Equatorial Africa wherein Nature makes a specialty of raising pigmy men and beasts. It lies west of the great central lakes and near to the Equator. We have had much to do with living pigmies of three kinds, and only the pigmy man turned out badly. For him our civilization was a shock that he was unable to endure, and it destroyed him. That in brief is the story of Ota Benga, of the Congo.

Really, I count it as strange that so many white men should have gone to Liberia and the Congo Free State, and for many years spent time there, without having come in contact with the strange wild animals concerning which I now will write. We are going to deal with the Pigmy Hippopotamus and the Pigmy Elephant, with both of which we have had somewhat to do.

Naturally, when a huge animal like an African elephant 11 feet high, or a monster Nile hippopotamus of 6,000 pounds, is caricatured by a miniature species so small it looks like an animated joke, the tiny one astonishes even the natives.

Of these two oddities of Nature, I count the Pigmy Hippopotamus as the most interesting. It is only one-fourteenth the size of the Nile hippo "mountain of

mummy," which is known as *the* hippopotamus. Perhaps it is the enormous bulk and the cavernous mouth of the Big One that makes the Little One seem so absurdly small.

I am not going into the history of the discoveries of these species. There is too much else to be said. However, the Pigmy Hippo species of the interior of Liberia —the Black Republic of West Africa—was first made known to white men in 1844, but it was not really put on the map of the world until 1912. In that year, through the enterprise of Carl Hagenback that species burst upon the zoological world like the fall of a black and shiny meteorite.

Carl Hagenback was the most enterprising, successful and famous collector of and dealer in wild animals who has lived since zoological gardens began. He was outfitted by Nature with boundless courage, an indomitable will, a sound heart and pleasing personality. His heart's desire was to place the greatest possible number of the world's most wonderful animals within daily reach of the greatest possible number of people. His storage-plant on Horsemarket Street, Hamburg, presently blossomed out into the great show-place at Stellingen, a suburb, to which the public is admitted for an admission fee.

Mr. Hagenbeck's enterprise, and his outfit of collectors and "travellers" for animals, reached out all over the world, but particularly throughout Africa, Asia, the East Indies and Australia. He collected large animals and large birds on a grand scale, and the German steam-

ship owners wisely and cheerfully backed him through thick and through thin. He did not have to beg them for fair shipping privileges. They were cheerfully and wisely offered. Carl never was more happy than in contemplating 10 elephants, 20 zebras, 15 lions, 40 African antelopes and 50 full-grown ostriches in one shipment. His losses sometimes were very heavy; but of them he said: "I push them out of my mind, and forget them in thinking of the success that I will have next time!"

In 1911 this king of animal-dealers sent to Liberia an intrepid and resourceful explorer and collector named Hans Schomburgk. His field of operation lay in a wild region so plentifully supplied with cannibals that any man who objected to being eaten had great need to watch his steps.

Herr Schomburgk landed at Monrovia, went to Scheffelinsville, engaged a few natives and went six days' journey up the Duquea River. After a month's hard hunting he at last had the good luck to see a pigmy hippo, which probably was the first one ever seen by a white man. But that animal could not be caught; and presently the hunter returned to the coast. There he promptly fitted out anew, and went back into the Golah country.

Next in order, a pigmy presently was caught in a pit, at the edge of a river; but the torrential rains enabled the animal to escape, and also sent all the natives of the party down with fever. Again the baffled hunter returned to the coast.

For the third time he raised a party. With nearly fifty men he once more plunged into the jungle, with plans more fully matured, and an understanding of the difficulties to be overcome. In the native town of Taquema Mr. Schomburgk camped, and made friends with Chief Tawe Dadwe.

From December until February 27 the hunter toiled, without once having scored on the elusive pigmy hippo.

At last, however, the real haunts of those mysterious and almost unknown beasts were found. And this is what Mr. Schomburgk found out about their mode of life, and their manner of saving their clumsy bodies from destruction by wild men and savage animals. When you see a particularly helpless wild animal, always try to find out how it has managed to save itself from being exterminated by its more active and more powerful enemies.

"The Lofa River," says Mr. Schomburgk, "one of the biggest rivers of Liberia, flows within an hour of Taquema. For two months I hunted on the small tributaries of that river. In spite of the greatest endeavors and the hardest work which I have done during my long hunting career in Africa, I did not even manage to shoot one of these shy and secretive animals in order that I might send home proof of its existence.

"The greatest difficulty in hunting the Liberian hippopotamus is that, unlike their big cousins, they do not frequent the rivers! They make their home deep in the inhospitable forest, in the dense vegetation, on the banks

of the small forest streams. But, not satisfied with the protection the forest affords them, they enlarge the hollows which the water has washed under the banks, and in these tunnels, where they are invisible from the banks, they sleep during the heat of the day."

At last, when almost in despair, on February 27, while following up a small herd of *pigmy elephants* to shoot one, he found the fresh trail of a pigmy hippo down in the bed of a brook with hardly two inches of water, and followed it until it led into a hole concealed under the bank. On thrusting a long stick into the hole, a grunt was heard. An absurd little hippo thrust its head out of the hole into view, and in a moment the tireless hunter had shot and secured a real, flesh-and-blood specimen.

Only those who have gone through such experiences can imagine Mr. Schomburgk's feeling of triumph at that moment. But his great object was to catch some of those wonderful beasts alive and unhurt.

"Wherever I found a likely place," says the explorer, "I had a pit dug. It is easy to catch the great East African hippo, which keeps continually in the same water and uses the same tracks. With the pigmy hippo, it is very hard even to find a place where there is the slightest chance of catching one, because this brute *roams through the forest like an elephant or a pig*, mostly goes singly, though sometimes in pairs, and rarely uses the same track twice.

"Meanwhile, over *a hundred* pits had been dug by my

men, all carefully dug seven feet deep, and covered so that not the sharpest eye could detect any sign of danger."

Two days after the shooting of the specimen hippo, the hunter's black boy rushed to his tent, shouting:

"Massa! Massa! Dem more (hippo) done catch!"

A fine, full-grown male had fallen into a pit.

"Early the next morning I reached the place. Before night a fence had been built around the hole, and the animal was let out."

Within less than two weeks, two others were caught. Still later two more were taken, making a total of five. But they were in the heart of a jungle wilderness, miles and miles from both water transportation and roads. An adult pigmy hippo weighs 419 pounds; and at first the only transportation possible to Mr. Schomburgk was—men! The only roads were rough jungle paths.

The explorer's transportation troubles fully matched all those that he had surmounted in finding the real haunts of his quarry, and making the captures. A less resourceful and determined man, and a less skilful courtier, would have broken down utterly on the transportation feature of the enterprise. It was because we were able to understand and appreciate *the difficulties and the costs* of that extra-hazardous enterprise that the New York Zoological Society later on was willing to pay $15,000 for three of those hard-won zoological prizes.

But to finish our story.

In order to enable men to carry those captive hippos without hurting them, big basket-work crates were made

of tough green lianas and rattans, each large enough to comfortably hold a hippo standing erect. Each of these travelling cages was swung midway under two long poles, and it took about twenty strong, husky men to carry one. "No one," says the general of that expeditionary force, "can imagine the enormous difficulties of the transport of those heavy animals through the roadless timberland of Liberia. From the farthest place inland, where I caught three animals, it took me, even after my men had cut the roads, *twelve days* carrying to reach the first river on which I could use boat transport to the coast.

"The Golah people refused to carry them. For the big animals I needed at least *forty* men each, to cut roads and carry. Had it not been for the Liberian Government, which had appointed me a Major on the Geographical Staff, I never would have been able to bring my expedition to a satisfactory end."

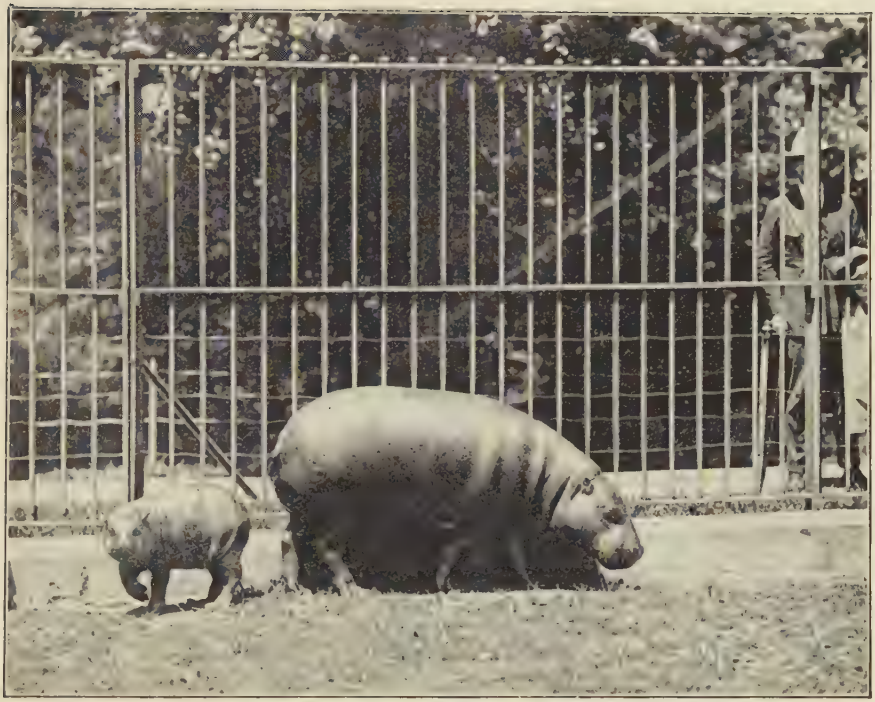
In the gravest crisis, Mr. Schomburgk states that in order to make King Gongzoo keep his pledge about furnishing carriers, which had already been paid for, he arrested the King in his own village, and held him a prisoner until his people assembled the help wanted. This had been made possible by the presence of the soldiers that had generously been furnished by His Excellency, the President of Liberia, Mr. D. O. Howard.

At Mr. Schomburgk's central station he and the five animals were met by one of Carl Hagenbeck's most experienced animal keepers, Mr. Moltmann, who had been

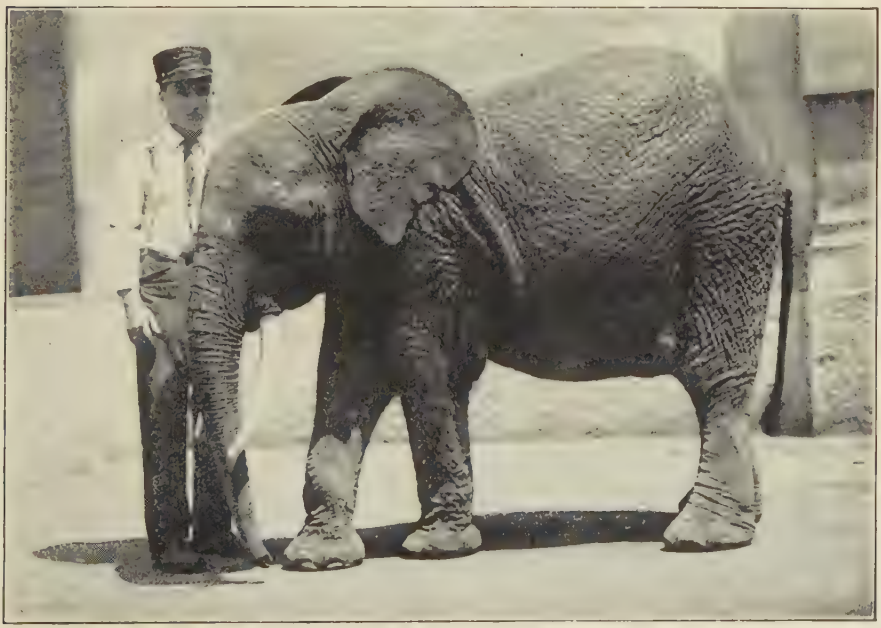
sent out from Hamburg. "At last we reached Japacca, and could put our poor, ill-treated animals into the proper transport cages that had been sent out from Hamburg."

Eventually, and by well-deserved good fortune, the animals were successfully loaded upon a ship in an open roadstead, and all arrived safely in Hamburg. They arrived in Stellingen while the zoological garden "feeling" in Germany against Mr. Hagenbeck—because he thought seriously of building another Stellingen show-place in Berlin—was at its height. We were told that the German gardens had declared a boycott against the king of wild-animal collectors. As a result of this, the New York Zoological Society was offered *three* of those prize pigmy hippos, instead of one only. We did not find fault with the price, and we did not delay our acceptance.

The three animals, two full-grown males and one half-grown female, reached us on July 10, 1912, alive, well, contented with life and feeding with the serenity and clock-like regularity of three fat pigs. From that day to January 1, 1924, not one of them ever has been ill for an hour, or missed a meal. Our heaviest investment in a single wild animal species has proven a huge success. Three young have been born, and the second and third ones lived and grew up to maturity; so that now we have a herd of five. They are of perpetual interest to the public; and we wish that all our visitors might know the tremendous efforts that were required to capture the original three, and land them here.



THE PIGMY HIPPOPOTAMUS OF LIBERIA.
Mother and baby, in the New York Zoological Park.



PIGMY WEST AFRICAN ELEPHANT, "CONGO."
The Type Specimen, in the Zoological Park, not quite fully grown.

In order to promote remembrance, I repeat that a full-grown pigmy hippopotamus is about one-fourteenth the bulk and weight of an adult of the big species. One of our full-grown males stands 30 inches high at the shoulders, measures 70 inches from end of nose to base of tail and the tail is 12 inches more. The skin is hairless, as smooth as well-polished mahogany, as shiny black-brown as if recently varnished, and the wearer is as fat as a pig.

The shape of the head is very different from that of the big hippo. It is much more rounded, and less flat on top. The ear is the only part of the pigmy that is capable of rapid motion, and the rapidity with which it can wiggle when ordered to do so is both surprising and amusing. The eyes are small, black and beady. The lower jaw is furnished with two formidable tusks, for cutting food and for defense; and in a close-up fight they could inflict ugly and deep wounds. Our bachelor male specimen is quite savage in temper, and not to be trusted.

The mother of the three babies that have been born is a wise and good mother. She knows four times as much about the first duty of motherhood—to nurse her young—as does our chimpanzee, Suzette. The latter does not know enough about children to know that they *must* be held up to the breast and made free to nurse, or die.

Yes; our pigmy hippos are about the most satisfactory animals that we have. They eat, sleep and bathe like reasoning beings, and they are not always ready to

catch cold and contract pneumonia at the passing of any vagrant breath of cool air.

You will find them at the two ends of the Elephant House, in the New York Zoological Park, or if it is in summer, out in their private parks.

XXII

ANOTHER JUNGLE PIGMY FROM AFRICA: THE PIGMY ELEPHANT

IN one of the park-like yards of the elephants' palace of the New York Zoological Park, on July 1, 1924, there was playfully running about and joyously flapping her funny little round ears, the drollest little elephant that ever came to our show. It was "Tiny," a little girl Pigmy Elephant, and she is a living monument to the dulness of the human race, both white and black, as that race has manifested itself in Equatorial West Africa for *some hundreds of years!*

During the last two centuries—not to weary ourselves by going farther back—thousands of white traders, hundreds of white officials, hundreds of missionaries, scores upon scores of hunters and animal dealers and probably half a hundred "professional" naturalists have worked the West African coast on both sides of the Equator, for a total of 200 miles or more inland, without ever collecting or even recognizing a Pigmy Elephant. The white nationalities represented have been English, French, German, American and Belgian.

The traders have bought and exported ivory elephant tusks in quantities formerly great, and we know that thousands of the queer-shaped and tiny tusks of the pigmy were part of that loot from the jungle. But, one and all, they never developed the fact that a *small species* of ele-

phant was represented. Ivory hunters, sportsmen and explorers—and, sad to say, some naturalists also—have gone elephant hunting and killed many elephants without having the eyes to see the small round ears, extra toes and miniature tusks of the pigmy species.

No. For two centuries a wonderful undescribed elephant actually thrust itself under the eyes of all those people, who should have noticed, without having been understandingly seen at all! It was a carnival of heedlessness.

At last the redoubtable Carl Hagenbeck appeared upon the scene. I never learned what impelled him to send out men to catch elephants in West Africa, but it was his men who captured the first Pigmy Elephant that ever came into a zoo. When it finally landed in Hamburg, a German naturalist, Professor Noakes, saw that it represented a new and undescribed species, and he described and christened it with the Latin name of *Loxodonta pumilio*. That very type-specimen animal was immediately purchased by our Zoological Society, and brought to New York.

It being a male, we named him "Congo," and he lived with us for ten years. He grew to maturity. When fully grown his height was 6 feet 8 inches, and his weight was 2,700 pounds. His tusks were 23½ inches long outside the lip, and no thicker than a lady's wrist. Finally he contracted an incurable leg disease, and died. Judging by the number of years it took him to reach maturity, he should have lived about forty-five years.

Aside from its pigmy size, which is limited to a height under 7 feet, the most noticeable different feature of this new elephant species is its small and round ears. It will be remembered that other African elephants have ears that are enormously large, and triangular in shape. The pigmy has five front toes and four hind toes, which is one more on each foot than the number allotted by Nature to the big African elephants.

Our "Congo," the type specimen, died in July, 1915, and immediately thereafter we began a quest for a successor. After that, whenever a sportsman or traveller came to us and said, "I am going to West Africa. Is there anything you want from there?" he was immediately answered:

"Yes. *Please* bring to us another Pigmy Elephant."

In each case we supplied plans and specifications of the species desired, in the form of pictures and descriptions; and at first we offered $3,000 as the reward. Our "Congo" cost only $2,200.

For seven years that offer was kept going; but no gallant hunter, or naturalist, or animal dealer came forward to deliver the goods and claim it.

Finally, in the winter of 1921–22 Miss Alyse Cunningham, of London, the trainer of the now famous John Gorilla, wrote me that she and her brother were going to French West Africa to obtain gorillas; and she, too, asked the eternal question. Knowing the business acumen, practical sense and tireless industry of Miss Cunningham, I was inspired by a prophetic feeling that *at last*

Opportunity had knocked at our door! At once we ordered a Pigmy Elephant, raised the reward to $4,000 and sent on the usual outfit of photographs and text. Having written to assure me that we surely should have our heart's desire, Miss Cunningham sailed away to Fernan Vaz.

During the silence that followed I received a visit from a New York traveller, Doctor Carr, as a direct arrival from the Congo country. With commendable enthusiasm he informed me that another American, named J. R. Evans, under a special permit from the Belgian Government, had shot two very small "water elephants" near the Kassai River, the big southern tributary of the Congo. The skins of both had been preserved, and presented to two museums on the other side of the Atlantic. A few days later a copy of the eighth edition of Rowland Ward's admirable *Records of Big Game* arrived—and there in it was a picture of one of those very pigmy elephants (*Loxodonta pumilio*) of Mr. Evans, already mounted and displayed in the Tring Museum of the Honorable Walter Rothschild. The other is in the British Museum of Natural History. The locality of it all was Lake Leopold II, Congo Free State, about 140 miles northeast of the confluence of the Congo and Kassai Rivers.

Once more silence ensued; and then came a cable message that thrilled the Zoological Park through and through. It was from Captain E. A. Cunningham, R. F. A., and dated at some wild place in French West Africa. It said:

"Pigmy Elephant captured. Cable 200 pounds."

We cabled it; and after a horribly long wait, of weeks and months, Captain Cunningham landed in New York with his prize. The latter had sustained a cracked leg bone in the right hind leg, which had almost healed, but otherwise it was as good as new. At once Doctor Blair put the injured and weak leg into a supporting boot of steel and leather, and in two months that one was as strong and useful as its mate.

Our new pigmy prize was captured by Captain Cunningham and a very small party of natives on August 30, 1922, at Lake N'Gobi, French West Africa, about eighty miles southeast of Fernan Vaz, and *only fifty miles from the Atlantic coast!*

It is believed that it was born in June, 1920, and was therefore about two and one-half years old when it arrived at the Park on December 6, 1922. It was then 36 inches in height at the shoulder—about the size of a baby Indian elephant at birth—and its weight then was 446 pounds. On June 13, 1924, she weighed 1125 pounds!

This specimen is true to the type of its species; but we have some difficulty in making our visitors understand that it represents a genuine pigmy species, and is not merely a small baby of a large species.

"Tiny" is the most affectionate and *playful* elephant that we ever have known. Her well-rounded body seems ready to burst with prosperity and the joy of good living. She wishes to be petted all the time. Her smooth and thin-skinned little trunk is always coaxing

or exploring for food. Her running exercises in her private park excite roars of laughter. Up to January 1, 1924, no tusks were visible. We have been told that the females of this species do not always carry tusks. Those owned by "Congo" (23½ inches beyond the lip) were an unusually good pair.

XXIII

A WILD SHEEP TALE FROM SOUTH AMERICA

"I can not say how the Truth may be.
I say the tale as 'twas said to me."

DURING fifty years of ups and downs with wild animals, I have listened to many a weird wild-animal tale. The woods of the world are full of them. So many are told in timber forests by the lumbermen of the North that my good forester friend, William T. Cox, has made them up into an illustrated book, the title of which is *Fearsome Animals of the Lumber Woods.* That collection of wholly imaginary "animals" described by the lumber-jacks, and at last pictured, is both astonishing and diverting; but the wildly impossible animals are not all in the lumber woods of the North.

In Demerara I heard of two wonder animals. One was called the "warracaba tiger," that goes in great bands of a hundred or more, hungrily sweeping through the forests with perfectly irresistible fury and appetite, from which all men flee in terror. The other was the "water hass," an aquatic vampire, in form like a young and beautiful woman creature with long hair. She rises beside small boats and pulls strong men overboard. My informant told me that out of the darkness of a tropic night one rose near his boat, made a wild grab for him,

missed him—"and the next mornin' I found caught fast on the side of me boat a woman's hair *three foot long*, sir!" Old Paulie visibly thrilled with post-facto terror as he told of it.

Only five years ago, a wonder tale of a wild animal swooped down upon me out of a clear sky, and the memory of it is so consumedly thrilling that I will now set it down.

A polite admirer of the Park, of foreign antecedents, ceremoniously called upon me to ask for some information. He was a sedate man about fifty years young, highly intelligent, and mannered like a gentleman. After his call had been finished and his departure was in order, he paused a moment and quietly said:

"Have you ever heard of the wild sheep of South America?" I hastened to say no; and also that no one else ever had—so far as known.

"Well," said Mr. Musonius, "then I must tell you something. I live in western Venezuela, on one of the large tributaries of the upper Orinoco River. I represent an exporting company, and for several years it has been my business to collect and ship out the products of that country. I came here in a great hurry to purchase another steamer for my company. The war has greatly interfered with our business."

"I know Carl Hagenbeck," he went on, "and I have sent out to him many animals. I am breeding tapirs and capybaras now; and I keep deer and other animals. I am fond of such things."

Here I manifested a proper degree of interest in those enterprises. My visitor continued.

"There is a large wild sheep in the western mountains of Venezuela."

Here I registered about 12,000 volts of surprise.

"Oh, impossible! There is not in all South America, nor in Central America south of Mexico, one living trace of the wild-sheep genus."

"So some people believe," said my visitor gently. "But I have made a discovery. In Venezuela there is at least a sheep-like wild animal, with very long horns."

"Have you ever seen one?"

"Yes, I once saw a herd of fifteen or twenty—and quite near."

"This is amazing. Please tell me all about it."

"Well, it occurred at the foot of the high mountains, far back, at the source of the mountain tributaries of the Orinoco. I went there looking for oil. [Many other explorers have searched South America for oil during the past fifteen years!] At the end of a fifteen days' journey from where we had to leave our canoes, we came to a strange place. It was a basin-like valley, with good soil, very good grass, plenty of wild fruit and quite surrounded by high mountains. All my companions were Indians, and at first they strongly objected to going into that valley, because of the 'evil spirits' in it. But we went in.

"We soon found there the tracks of some large hoofed animals, much larger than deer, and at last we found a herd of the animals themselves. They were large, like

big sheep, and they had under their bodies and low down on their sides long, brown hair, quite half a foot long, or more. The hair on their bodies was short and straight, and their color was very dark brown."

"Did they have horns?"

"Oh, yes; large and fine horns. The largest ones were four or five feet long."

"Four or five *feet?*" I cried incredulously.

"Yes," said my visitor calmly, "quite that. They rose from the head, sloped backward, then described a great downward sweep and came forward."

"But that means ibex horns."

"No. I know the ibex. They have many large knobs on their horns." [Which was quite correct.]

"And did those animals have *rings* on their horns?"

"Yes, rings. Just like sheep. And at the tips they were wide apart."

Here I fell back in my high-backed office-chair, and breathed like a foundered horse. My visitor lighted a cigarette, but before he counted ten on me I was on my feet again. At last I recovered sufficiently to ask in a faint voice:

"How near were you to those animals?"

"Just about fifty steps."

"Then you must have seen them quite plainly."

"Oh, yes, very plainly. *And I photographed them!*"

At that punch I went over against the ropes, groggy, but game to the last.

"But the film was a failure?" I demanded hopefully.

From a drawing by E. Rungius Futua.

THE UNBELIEVABLE WILD MOUNTAIN SHEEP OF SOUTH AMERICA.

Drawn from the description by the man who said he saw and photographed it!

"No. It came out all right."

"Have you got a print in your pocket?" I cried in a shrill tone.

"No. I am very sorry, but I have none with me. I was called down the river in such haste last month to come here that I did not leave from my home. But I have a good print in my desk, at my office."

"For heaven's sake, have some one send it to me—*instantly!* Will you?"

"My sister can do that. I will write to her—if you will give me your card."

I have forgotten the reason why Mr. Musonius did not shoot one of those animals. But there was a reason.

"It is *dreadful* that you brought with you no evidence of the character of that strange animal. Has no one ever killed one? Has no one even a pair of horns? Or a piece of skin?"

"Yes. I know a Venezuelan trader up there who has a pair of horns in his veranda. I will try to get them for you—since you are interested."

"Please do. I am greatly interested. If you can deliver here a skin of one of those animals——"

"I shall try to obtain one for you alive!"

"We will give you a thousand dollars for one that answers to your description."

"Well, I am not particular about the money, but I would like to obtain one for you—because you are interested. I mentioned this to the people in Washington," he said with an injured air, "but they were not interested."

Thus ended that memorable interview. It left me in a state bordering on coma and paresis. The worst of it all was that *the man had not asked me for anything!* Now, if he had asked for a cash loan, or a written "order for animals" of the kind so dear to the heart of the customary guileless traveller to South America, I should not worry. Had he asked for a picture, a book, or even railroad fare to Philadelphia, I would have felt calm and comfortable. But he actually asked for nothing!

"Well," I said, "it is certain that I never will see him again."

Three days later Mr. Musonius again appeared.

"I have called again," he said cheerfully, "because you were interested in those strange sheep that I saw. You have encouraged me to do my best to find them again, and send you some real specimens. As soon as I finish my business here—which is quite difficult—I shall return; and you will hear from me again. Believe me, I will send you something."

"I am sure you will," I responded desperately. "Meanwhile, *please* have that photograph and those horns sent to me, without delay."

"I will. I *promise* you that I will."

And again he departed, without having exhibited even the handle of an axe to be ground at my expense.

The reader can now imagine my feelings better than I can describe them. Now that it is all over, I marvel that I did not have heart-failure.

Was the story impossible? Certainly not! By no

means! Not half so much so as the okapi of Central Africa, the pigmy hippo, the pigmy elephant, or the *snow-white* sheep of Alaska, which was not "discovered" by an intelligent man until 1884! A sheep like that in South America would be no more strange or isolated than our isolated prong-horned antelope or white mountain goat were when they were first put on the zoological map of North America.

I still await the footfall of my surprise-giving friend, bearing, who shall say how many undescribed South American sheep skins and horns, with photographs galore, wherewith to establish the type of a new sheep genus in South America, now supposed to be sheepless. But now, alas, I begin to fear that I shall see him nevermore, and that *Ovicapra nigricans*, of Venezuela, never will come to me in this world. Under the present deplorable circumstances all we can do is to draw from Mr. Musonius's description a sketch of the Great Unknown, print it here, and write below it the sad words: "It might have been!"

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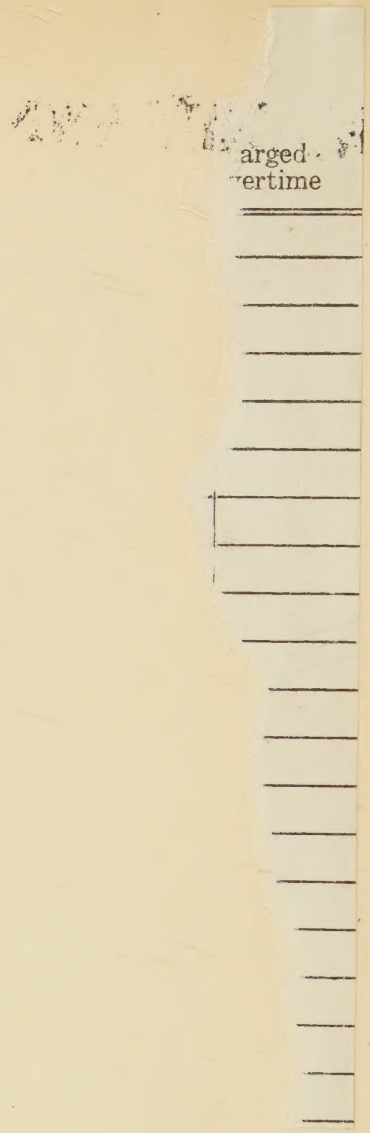
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